ENTOMOLOGICAL NEWS

AND

PROCEEDINGS OF THE ENTOMOLOGICAL SECTION

ACADEMY OF NATURAL SCIENCES, PHILADELPHIA.

VOL. XVIII. APRIL, 1907. NO. 4.

CONTENTS:

Needham—The Eggs of Benacus and their Hatching..... 113
Smith and Grossbeck—Studies in certain Cicada Species..... 116
Skinner—Studies of Thecla irus Godart and T. henrici Grote and Robinson 129.
Aldrich—The Dipterous Genus Scellus, with one new Species..... 133
Doane—Notes on the Habits of Scellus virago Ald..... 136
Daecke—Annotated List of the Species of Chrysops occurring in New Jersey and Descriptions of two New Species..... 139
Grossbeck—Notes on some Species of Geometrids..... 146
Knab—The Classification of the Culicidae according to Scale-Vestiture Characters..... 151
Carpenter—Cards for Data..... 155
Baker—De Luxe Editions of Entomological Works..... 157
Editorial..... 160
Notes and News..... 161
Doings of Societies..... 163

The Eggs of Benacus and Their Hatching.

By JAMES G. NEEDHAM.

(Plate II)

Among the largest of insect eggs are those of our aquatic Hemiptera. Some of these are laid under water, some in the air, attached to the stems of plants that project above the surface. Few are better known than those of *Zaitha*, which the male carries through their incubation period in a layer covering his back. Those of *Ranatra* are familiar enough also, though immersed in the stems of aquatic plants: their presence is always betrayed by the two long micropylar appendages that project conspicuously into the water. *Belostoma* and *Benacus* lay their eggs above water, commonly attaching them in broad one-layered clusters to the vertical sides of dead typha stems. Those of *Belostoma* have recently been carefully described by Mr. Bueno. It is strange that those of *Benacus*, the largest of them all, should still remain comparatively unknown and unnoticed.

Benacus occurs sparingly in a pond on the campus of Lake Forest College. A few specimens are taken each year in the course of general collecting. During the past eight years I have done more or less collecting there, from the opening until the middle of June, but I have encountered living eggs but once, that was on June 13, 1903. Doubtless they might have been found oftener had I been specially looking for them; for twice I have found the dead, collapsed, and empty shells still adhering to the typha stems in autumn.

The egg clusters are two to three inches long, and contain 75 to 100 eggs of a size, that for insects, is fairly immense. The eggs are attached by one end in more or less regular rows, and they cover in a single layer the broader, flatter side of the stem. They would be conspicuous but for their resemblance in color to the stem.

Protective coloration is common enough among birds' eggs. Here seems to be another genuine case of it among the eggs of insects—not a mere general resemblance, such as the green color of eggs placed upon a green leaf, but specific resemblance to the details of the background against which the eggs are seen. They are longitudinally streaked with brown upon a lighter ground, and the streakings are so placed and so spaced that they fall into line with the flutings of the stem, and greatly assist in the concealment of the cluster. I left the cluster shown in Plate 2, Fig. 1, in the field for several days undisturbed after its discovery, to insure the normal progress of its incubation, and watched it from day to day. At each return to it I had some difficulty at first locating it again, although it occupied an exposed situation on the stem.

Seen under a lens, the eggs remind one of a pile of Georgia watermelons (Plate 2, Fig. 3). If the color were green instead of brown the resemblance would be perfect. Not only is the shape the same, the "blossom end" being plainly suggested, and the exposed upper side being slightly more convex than the lower, but the streakings fade out below in a very similar manner. However, a closer inspection reveals a different feature at each end. At the free end just below the "blossom scar" there is an obliquely-placed white crescent, whose

arms extend down upon the sides and mark out the cap that the young *Benacus* will later push off at hatching. The brown lines of the under surface stop short at the edge of this crescent; they are still more abbreviated at the opposite end of the egg. At the basal end the egg is broadly capped with uniform dark brown (Plate 2, Fig. 2). In Figure 1 of the plate, a few eggs have been removed from the right side, and two are laid down in an inverted position to show the paler lower side and the brown basal end.

The individual egg is 5 mm. long and 2 mm. in greatest diameter. It is oblong-oval in form, with very obtuse ends as shown in the figures, and it is marked longitudinally with twenty or more irregular stripes (often interrupted, cleft fenestrate, or anastomosing, and always with uneven margins), convergent toward the center of the free end upon the upper side.

Their incubation period was not determined. The single cluster of unknown age found upon the 13th of June, began hatching on the 23d and finished on the 24th of the same month. Their hatching was a curious sight. The photograph shown in Fig. 3 of the plate, was taken in the midst of the process and shows two empty eggshells, several eggs in the process of "chipping," and four buglings emerging, the uppermost one nearly out and the lowermost, just lifting the detachable cap of the shell. The embryo lies once folded within the shell, its head flexed upon its breast, and its beak and legs extended flat against the venter of the abdomen. Thus the dorsum of the prothorax abuts against the detachable crescentic groove. The eyes appear before hatching as back spots upon the arms of this crescent. The back is almost invariably downward, as seen in the figure, though sometimes turned a little to one side. On account of the obliquity of the pale crescent, and the constant position of the embryo in relation to it, these eggs might readily be oriented for section-cutting in embryology.

The thin lateral margins of the abdomen unrolling at hatching, and the legs becoming extended, the fledgling at once assumes proportions seemingly wholly incompatible with the size of the egg from which it came. Figure 2 of the plate shows

a newly hatched larva and an unhatched egg taken together for comparison.

Figure 4 of the plate is a photograph from life of the adult *Benacus.* It was taken while clinging to a white board in an aquarium, head downward (the photo print accidentally mounted in the opposite position for the plate). As is well known, the adult flies freely from pond to pond, coming with *Belostoma* to electric lights in cities and towns. It lays its eggs upon a dry stem several inches above the surface of the water.

Studies in Certain Cicada Species.

By John B. Smith and John A. Grossbeck.

Plates III, IV, V.

This study originated in the desire of the senior author to prepare for his annual report an account of the periodical *Cicada,* a brood of which was due to appear in New Jersey, in 1906, and incidentally, to call attention to the other species that occurred within the limits of the State. Messrs. Davis and Joutel had just published their notes in Entomological News, Vol. XVII, page 237, and the junior author was assigned to the task of separating out our material which was fortunately quite rich, and to making such drawings and sketches as might be required to bring out the interesting features:—ovipositor, stridulating apparatus and the like. It was easy to separate the bulk of our material into the species recognized by Davis and Joutel, the more as Mr. Davis had used some of it in his work; but there remained a puzzling residue, part of which was eliminated when Prof. Osborn published his description of *Cicada fulvula* in Entomological News, Vol. XVII, page 322. None of the recent authors had seemed quite satisfied with the identification of *pruinosa* Say, and our own efforts to fit the specimens usually listed under that name to the description were hardly more satisfactory. But we found among our puzzles a very few examples that did fit, perfectly: the description as it stood might have been made from any one of them. But this left the common form nameless, unless some of the terms cited as synonyms of *tibicen* might really prove to be this form. The idea of including our study in the annual re-

port was now abandoned and additional material sought for. As usual, the collections proved poor in the common species, but from the Academy of Natural Sciences of Philadelphia, the Brooklyn Institute Museum, the American Museum of Natural History, the Children's Museum of Brooklyn, the U. S. National Museum at Washington, and from Messrs. W. T. Davis and E. Daecke we obtained series that enabled us to separate our species very nicely.

It became necessary now to determine the form to which Linné's term should be applied, and here another surprise was in store for us. The description of course fitted almost any *Cicada;* and the only pointer given by Linné himself was the reference to Merian's Surinam, pl. 49, where we found a fair figure of a species totally different in appearance from what we had been calling *tibicen.* Running down the literature to ascertain *how* the species came to be identified with our American type, we found that it rests upon a casual statement of Stal. The whole matter is interesting enough to warrant detail and both authors have been over some of the volumes to make sure of the facts.

On the occasion of a recent visit to Washington, Mr. O. Heideman was good enough to show me the *Cicada* material from Central and South America, and there is nowhere any specimen that could be mistaken for our so-called *tibicen,* while there are several of a type resembling Madame Merian's figure and among which I feel very confident the true *tibicen* may be identified. Mr. Heideman also showed me the works of Mr. Distant, and called my attention to the fact that in the "Biologia" *tibicen* was included only on the authority of Stal and not from any material identified with that species.

C. tibicen was described by Linné in the Syst. Nat. ed., X, p. 426, in the most general terms; the Merian figure already cited was referred to, and "Habitat in America" was added for locality. In 1767, in the 12th edition of the same work, Vol. I, pt. 2, the description and reference were repeated and nothing was added to modify the original statement as to locality.

In 1775, Fabricius in the Syst. Ent., 679, places the *Cicada*

tibicen of Linné in *Tettigonia,* cites Merian's Ins. of Surinam as before, and also Brown's Jamaica, pl. 43, f. 15. This figure which has been examined by Mr. Grossbeck may or may not be a species of the forms we have called *tibicen,* but it certainly does not seem to be the species figured by Madame Merian.

In 1778, De Geer, in his Insects, III, 212, pl. 32 (not 22 as usually cited), figures his *lyricen.* He cites *tibicen* Linn. as the same species, and credits Mme. Merian with the name *lyricen* or "lierman." He adds to his diagnosis the statement that the species is found in America "septentrionale" as well as "meridionale" and gives a detailed description of his material from New Jersey and Pennsylvania both as larva and adult, including the singing and egg-laying habits of the adult. There is no doubt that De Geer had a North American insect before him and there is no reasonable doubt that this was the exact form that Prof. Osborn has so recently described as *C. fulvula.* The figure is excellent and the description is accurate in all details. There can be no reasonable doubt as to the identity of *lyricen* De G.

In 1790, Olivier in the Enc. Meth., 749, refers to *tibicen* Linn., cites *lyricen* De Geer as a synonym, and quotes Merian as to the habits of the species and the damage done in coffee plantations.

As a new species he describes *C. opercularis* from the Isle of Java and cites Stoll, pl. 13, A and B, for a representation of the species. This figure of Stoll is utterly unlike anything that I know from North America, and is certainly incapable of being twisted into a resemblance to our "tibicen" or even the *tibicen* of Linné.

In 1794, Fabricius in the Ent. Syst., IV, 18, again refers to *tibicen,* as before, but adds the reference to De Geer, giving America meridionale as the habitat. On p. 19 he describes *Tettigonia variegata,* habitat in Carolina, just after *septendecim,* and says of it that it is of the size and build of the preceding, i. e., *septendecim.* There is nothing in this, and nothing in the subsequent description that refers to any resemblance or relation to *tibicen.*

In 1803, Fabricius in the Syst. Rhyng., p. 35, cites *tibicen*

as before, and again gives America meridionale as the habitat. To this is added, in the Academy copy, in Say's handwriting, "St. Paulo, Brasilia, Germar," indicating that some effort has been made to identify this with a South American form.

At p. 37, *variegata* is again described, placed as before and recorded from Carolina.

In 1825, Say described his *pruinosa,* knowing of the Fabrician and Linnæan species; but what forms he identified with the names I have no means of knowing.

In 1830, Germar gives in Thon's Archiv., II, p. 40 et seq., a descriptive list of Cicadids in which he refers to *variegata* Fabr., describes it at some length, and cites Roesel's Ins., pl. XXV, f. 5, as representative of the species.

Roesel's figure, unfortunately, tells nothing. It is not well drawn for identification and may be meant for any one of half a dozen or more species. It is said to be an "Indian" variety, but this may mean American as used.

Germar also refers to *opercularis* Oliv., gives Java as the habitat, and then adds that he believes it to be a variety of *variegata* in spite of the difference in locality. He cites Stoll's figure as usual and there is at least one important hint in this, because Stoll's figure does resemble *septendecim* in general build, and the Fabrician comparative reference is therefore in so far confirmed.

Walker's work in 1857 adds little to our knowledge, but he makes *lyricen* De G., *pruinosa* Say and *mannifera* Linn. synonyms of *tibicen,* while recording *opercularis* as a species unknown to him.

In 1869, Stal in his Hemiptera Fabriciana, II, 6, cites the *tibicen* of Linné, gives all the Fabrician references, adds as an additional synonym *opercularis* Oliv., gives America meridionalis as habitat and then comments:—this species inhabits boreal America.

Since that time matters have remained much as Stal left them. In 1841, Dr. Harris described *canicularis* in "Insects Injurious to Vegetation," p. 175, but Fitch disposes of that species in his Third Report in 1856. He says *pruinosa* is *tibicen* with the mealy powder not rubbed off, and *canicularis* is only a

small *pruinosa*. He quite correctly calls attention to the variation in the opercular plates and says they are not good bases for specific separation.

In 1892, Uhler in the Trans. Md. Acad. Sci., p. 149, makes *canicularis* a good species, but cites under *tibicen*, the names *lyricen, variegata, opercularis* and *pruinosa* as synonyms. He states that according to Germar the true *tibicen* is the common form figured by Stoll, and that Olivier's species having been described from that figure must be a synonym.

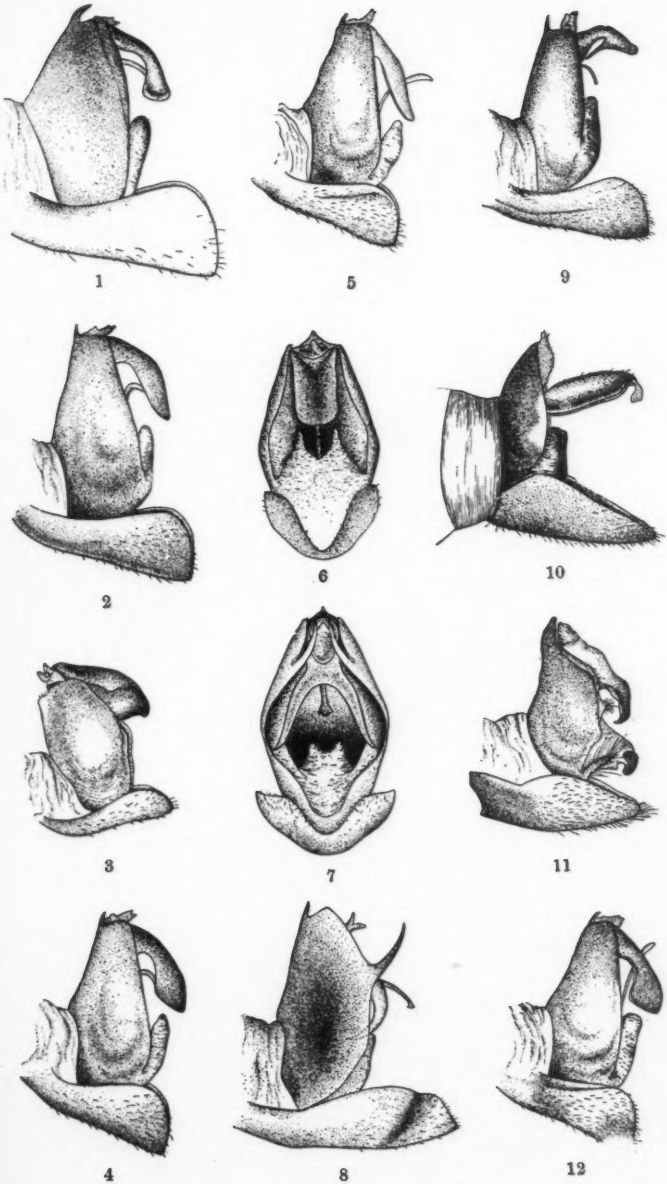
The most recent list of species is by McGillivray in the Can. Ent., XXXIII, p. 74, in which Uhler is followed as to *tibicen*, without original study of the problem.

The conclusions drawn from this study of the literature are that *C. tibicen* L. is not a North American species at all; but that, based on Merian's figure, it is a common Central and South American species. What we have called *tibicen* is an undescribed species. *C. opercularis* Oliv. is a Javan form for which there is absolutely no evidence that warrants us in identifying it with any American species. *C. variegata* Fabr. is an ally of *septendecim* which has not yet been identified in collections. *Lyricen* De G. has been redescribed as *C. fulvula*. De Geer's belief that he had the same form as Linné is based on nothing better than a general similarity.

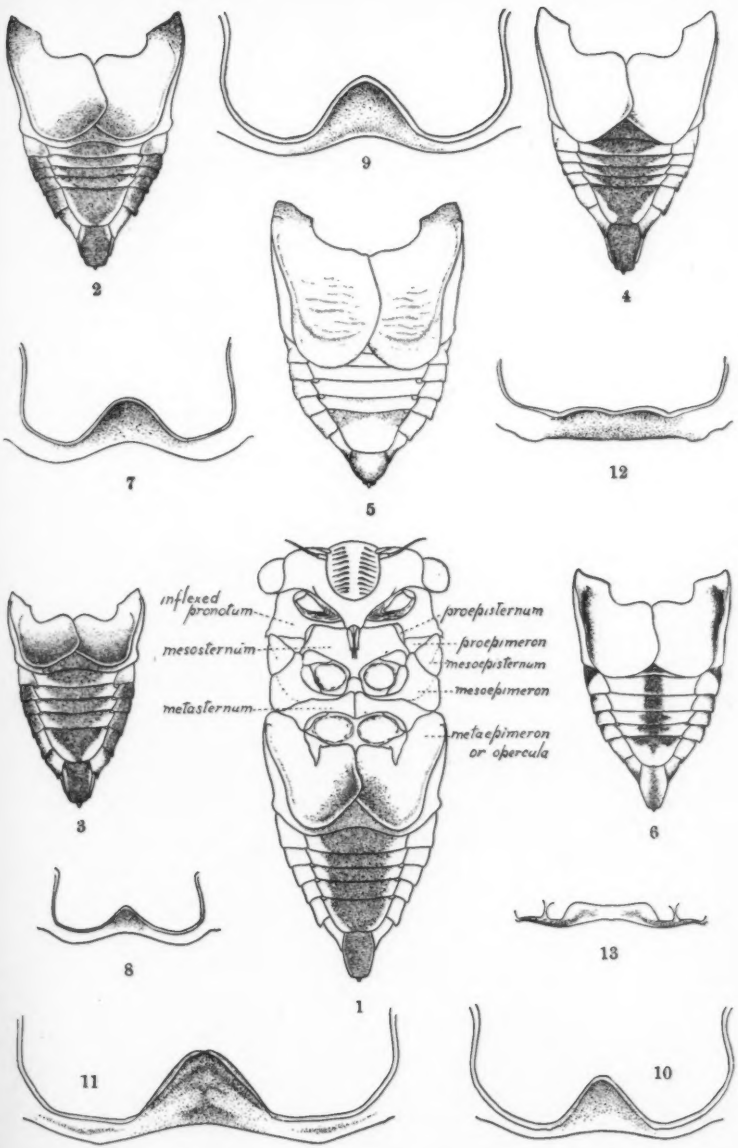
The notes on structure and the specific descriptions are by the junior author, though all points have been verified by both authors.

It seems strange that such large and common insects should have received so little careful attention. In most of the collections seen by us there were from two to five, and in one instance nine, species under the name *tibicen*. It would have been difficult to definitely separate the species in any one collection without additional material, and so from a number of sources something over two hundred and fifty specimens taken at many points in the eastern United States and a few from the western and southwestern portions were gathered together.

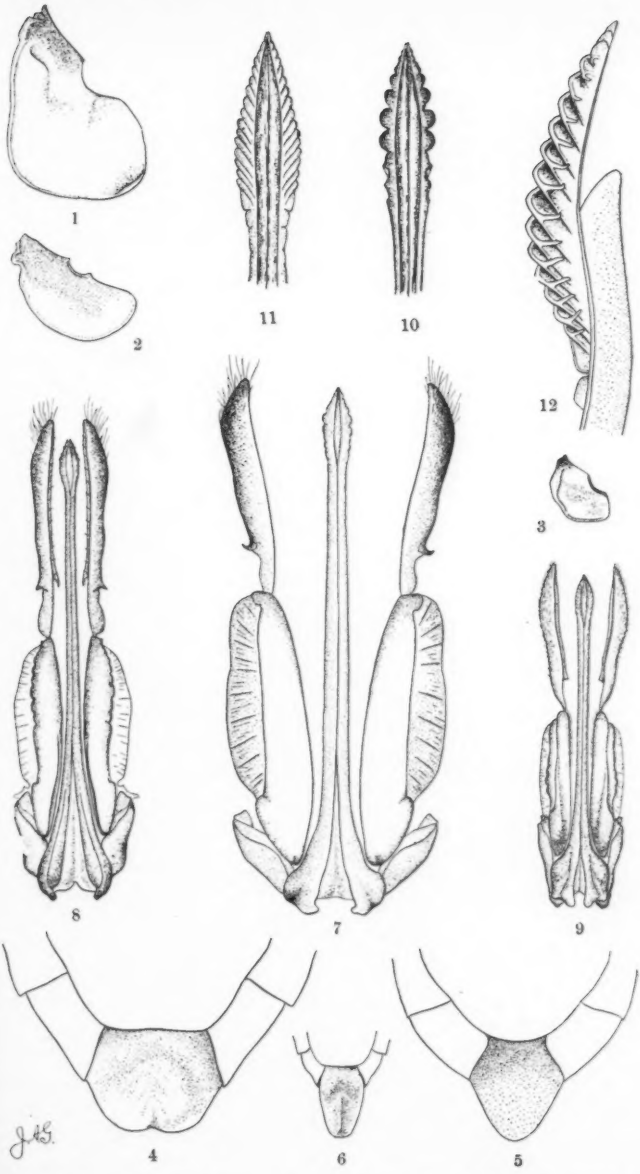
Having established the identity of Say's *pruinosa* and reached the conclusion that *tibicen* did not occur in North America at all, the description and figure of *lyricen* left no



1, Genitalia of *C. marginata* Say; 2, *C. pruinosa* Say; 3, *T. hieroglyphica* Say; 4, *C. davisi* nov. sp.; 5, *C. canicularis* Harris, from side; 6, from below; 7, *C.* sp. indet., from below; 8, same, from side; 9, *C. similaris* nov. sp.; 10, *T. noveboracensis* Em; 11, *T. septendecim* Linn.; 12, *C. lyricen* DeG.



1, *C. pruinosa* from beneath, the appendages removed and thoracic sclerites named; 2, abdomen of typical *C. linnei*, with opercula attached; 3, *C. canicularis*; 4, *C. lyricen*; 5, *C. sayi*; 6, *C. davisi*; 7, 1st and 2nd ventral abdominal segments of typical *C. linnei*; 8, *C. canicularis*; 9, *C. sayi*; 10, *C. lyricen*; 11, *C. marginata*; 12, *T septendecim*; 13, *T. hieroglyphica*.



1, Operculum of *C. marginata*; 2, *T. septendecim*; 3, *T. hieroglyphica*; 4, last ventral segment of *C. marginata*; 5, *T. septendecim*; 6, *T. hieroglyphica*; 7, ovipositor of *C. marginata*; 8, *C. linnei*; 9, *T. septendecim*; 10, tip of ovipositor of *C. linnei*; 11, *T. septendecim*; 12, one of the side pieces of the tip of ovipositor of *T. septendecim*.

doubt as to the species intended and consequently *C. fulvula* Osborn falls into synonymy. *Canicularis* Harris is sufficiently well characterized to enable the species to be recognized with certainty. Having thus disposed of or identified all the published names we are free to name all other forms that are specifically distinct from them.

Cicada linnei is proposed for the species which has so long been known as *tibicen.*

Cicada sayi is proposed for the form hitherto erroneously known as *pruinosa.*

Cicada davisi, so called in honor of Mr. Wm. T. Davis, whose article induced the present critical study, is proposed for a very distinct little species which has been confused with *canicularis.*

Cicada similaris is proposed for a Floridan species, close to *lyricen* in general appearance, but widely variant in genitalic structure.

There are other species under our observation from the U. S. N. M. collection, which will eventually have to be named; but which we do not describe, partly because of the scant material at hand and principally because they are quite without the scope set for this study. The genitalia of one of these species from Mexico is figured, pl. III, f. 7 and 8, to illustrate the amount of variation displayed by members of the *tibicen* group.

There is considerable difference between species in a number of structural details, but most of them are subject to some variation. These differences may be used to good advantage for the separation of species, though in a few cases the variation is so great as to leave almost no definite line of demarcation between closely allied species when only one character is used. For the purposes of specific separation no structures are of more importance than the male genitalia, which in the Cicadids are large, strongly chitinized and easily examined. They are absolutely constant in form, however subtile certain processes may be, and are always to be relied upon. The uncus shows the greatest diversity of form. In the usual type it is broad above, with parallel lateral margins, and from the side is narrow, slightly constricted a short distance from the base, and

there tapered evenly to the apex. From the side it may appear pointed as in *canicularis,* pl. III, fig. 5; or capitate as in *marginata,* fig. 1; or subapically dilated as in *davisi,* fig. 4. In *similaris,* fig. 9, it has two spinelike processes on the under side, which together show as one from the side. An extreme form from Mexico (sp. indet.) is represented in figures 7 and 8, where it takes the form of a pair of curved horns. The large side pieces also show some difference in shape, though less than in the uncus.

The opercula afford good characters. Usually they vary but little, the single instance of great variability being in *canicularis,* which merges into the opposite extreme of *linnei.* Even the color of these structures is of some importance.

The first and second abdominal segments below are intimately united and appear almost as one, the first bordering the anterior margin of the second. Taken together they differ considerably in the various species, the greatest variability in any one species again showing in *canicularis.* The figures of *linnei* and *canicularis,* pl. IV, figures 7 and 8, though drawn to one scale, represent large and small specimens, respectively—the average size of each species—with size eliminated, the difference is not as great as at first appears; consequently, the amount of variation needed to bring the two forms together is not really so great. The last ventral abdominal segment, used by Davis and Joutel in their separation of *linnei* (*tibicen*), *canicularis* and *sayi* (*pruinosa*), are also of value.

The thoracic sclerites offer practically no differences in shape within generic limits. We have lettered these sclerites (pl. IV, fig. 1), using *pruinosa* for this purpose, but the result is not entirely satisfactory and some changes may have to be made. The prosternum lying between the front coxæ is hidden beneath the lower part of the head. The mesosternum is a large, broadly pentagonal sclerite, just anterior to and partly between the second pair of coxæ. In the prothorax, the large lateral pieces, immediately posterior to and at the sides of the front coxæ, are an inflexure of the pronotum. The two small sclerites posterior to it represent the propleural sclerites—the proepisternum and the proepimeron. Both pleural pieces of the

mesothorax occupy their proper places and are very little modified. The association of the names with sclerites is somewhat doubtful in the metathorax, and the notes here given are to induce observation. Dr. Sharp, in the Cambridge Natural History, speaks of the opercula as enlargements of the metepimera, and we have so designated them.

In the structure of the female we merely show the ovipositors of a few species—*marginata, linnei* and *septendecim.* The differences between them are not great; in *marginata* the basal portions are proportionately much larger than in *linnei,* which is taken as the type form, and the apical portions correspondingly shorter; in *septendecim* the structure is much as in *linnei,* but the entire organ is proportionately shorter. One of the side pieces of the tip of the ovipositor of *septendecim* is figured, highly magnified to show the hooks by which the splint is pulled out from the slit made in the twig.

Cicada pruinosa Say.

Length—♂, 33 mm., to tip of wing 49 mm.; ♀, 30 mm., to tip of wing 48 mm.—Head black, anterior margin on each side of clypeus and posterior margin between ocelli and compound eyes green; center of upper portion of clypeus with an elliptical green spot. Pronotum largely green, with two broad black marks beginning at anterior margin and becoming attenuated posteriorly where they join, inclosing a green, somewhat diamond-shaped spot; two other marks originate back of eyes and curve posteriorly toward the center; posterior and lateral margins wholly green. Mesonotum green, with black marks distributed as follows: On each side of center, beginning at anterior margin, is a broad mark which becomes slightly narrower and rounded posteriorly and ends before middle; a second mark narrowly separated from the first begins broadly at anterior margin, becomes greatly attenuated and sometimes divides as it proceeds posteriorly, then broadens abruptly and terminates just before the posterior margin; a third near the lateral margin begins as before and joins the second mark posteriorly; in center of posterior portion of mesonotum is a large mark, rounded posteriorly and extending in a point between the two central marks of the anterior portion. Abdomen above black, base of first segment with a white, heavily pruinose lateral dash, which encroaches to some extent upon the second segment; a similar but longer and broader lateral dash extends along the base of the third segment and a spot of the same color is on each side of the eighth segment. In the female the dash of the second segment differs from that of the male in not becoming

attenuated dorsally, but in being squarely truncated; the spot on the seventh segment also extends on to the following segment—that which ensheaths the ovipositor—and is apparent from above. Beneath the abdomen is pruinose on pleura and sides of sternum, the central portion shining black. The opercula are as broad as long, excluding the extension beyond the coxal cavity, and overlap slightly in the center.

Habitat.—Anglesea, September 8th; Cape May County, September 20th, and Bayside, October 21st,—all in New Jersey.

This is the most invariable of the species before us, as far as can be judged from the eight examples (7 ♂ and 1 ♀) studied. The thoracic markings are well defined and illustrate the type of maculation of this group. The abdominal ornamentation also is identical in all specimens of one sex.

Cicada sayi nov. sp.

Length.—♂, 30-35 mm., to tip of wings 45-53 mm.; ♀, 28-34 mm., to tip of wings 43-51 mm.—Head black, except for a small green spot just inside the compound eyes; upper portion of clypeus usually all black. Pronotum green, with two marks, sometimes broken, which begin broadly on anterior margin, become narrow and join posteriorly, forming a distinct V; lateral and posterior margins usually black, sometimes with a green spot on each side of the center of the latter, which may broaden or lengthen or, rarely, involve the whole margin save for a small central and lateral mark. Mesonotum black, with a fulvous background showing more or less plainly and the maculation always partaking of the general pattern described for *pruinosa*. Abdomen black, with a large white pruinose spot on each side of the first segment. Beneath, the entire body excluding the legs, heavily pruinose. The opercula are very large, longer than broad and overlap considerably in the center. The genitalia are similar to that figured for *C. fulvula;* the uncus dilated and truncated apically.

Habitat.—Ranges from New York southward to Alabama, and westward to the Mississippi River; in the vicinity of New York and New Jersey from mid-July to early October; Kentucky, May; Mississippi, early April. The dates for the Southern States are suggestive.

This is undoubtedly the most common form in the eastern United States, and probably occurs from Canada to the Gulf of Mexico east of the Mississippi, though we have no specimens outside the range given above. It is the most robust species occurring in New Jersey.

Cicada lyricen De Geer = **fulvula** Osborn.

Fifteen specimens of each sex, which agree in the main with Professor Osborn's description, are before us. With this number of individuals the range of variation is considerably beyond that given in his diagnosis. The pronotum in some is all black, except for a broad central line and the mesonotum in such is also black, with narrow fulvous lines indicating the usual pattern. In other examples fulvous is the predominating color, the black maculation being reduced; but the posterior and lateral borders of the pronotum are always black, except for a small spot which is sometimes present near the head. Green occasionally replaces the fulvous and, rarely, both are present on the same insect, the fulvous occuping the lateral portions of the mesothorax, the green the remainder of the background. The narrow pruinose line at the base of the abdomen is more often than not separated into two lateral linear spots and is rarely absent. Beneath, the black polished center with lateral pruinose borders holds true in all specimens. The opercula are as broad as long and vary in shape posteriorly from rounded or elliptical as described, to the more usual shape for this form, of a sub-quadrangle as shown in the figure. They are of a uniform pale brown color, quite different from the creamy yellow color, with black shadings, of most of the allied species. The genitalia are of the more usual form; the uncus much dilated and truncated apically.

Habitat.—New York to Florida and westward to Indiana; New York—Long Island and Staten Island, July to September; New Jersey—Normanock, July; Newfoundland, July 28; Paterson, July 14; Newark, July 27; New Brunswick, Farmingdale, August 12; Mentone, Alabama, August 10; Georgiana and Archer, Florida, July.

Cicada similaris nov. sp.

Length: ♂ 35 mm., to tip of wings 50 mm.

This species is very close to *C. lyricen,* but the great difference in the genitalia (pl. III, fig. 9) separates it at once from that species. The clasp or side piece is not very characteristic, but the uncus is curiously shaped like the head of a snake with expanded jaws, and from above the lower "jaw" is deeply

cleft, dividing it into two lateral spines. The present form differs further by the lateral border of the pronotum being largely green, which may, however, occur in *lyricen* by the enlargement of the green spot near the head, and by the slightly longer opercula which extend to the end of the third abdominal segment, the border of which is also more strongly reflexed. Otherwise it comes within the range of variation displayed by *lyricen.*

Type: One male from Fernandina, Florida, collection U. S. National Museum.

This may be the species which Professor Osborn regarded as the possible male of his *fulvula,* since he speaks of the opercula having "a distinct reflexed border," while in the true *fulvula* they are not more strongly reflexed than in other species.

Cicada canicularis Harris.

Length.—♂, 27-30 mm., to tip of wings 40-44 mm.; ♀, 26-27 mm., to tip of wings, 39-45 mm. The head and thoracic markings are much like those described for *pruinosa,* but the extreme lateral mark of the mesothorax rarely joins the sublateral one posteriorly. As a rule but little variation is shown, though in a few specimens the two central anterior marks combine, forming one large spot and each of the two lateral marks join in a like manner. The posterior and lateral margins of the prothorax are green, as in the entire background of the thorax, —and rarely, in heavily marked examples, there is a tendency for the anterior portion to become black. Abdomen above black, with small linear pruinose spots on the first segment in a few of the males only. Beneath, the center is highly polished black, with broad white pruinose borders. In the specimen from which the figure was made the pruinose border was removed, which shows the major portion of the pleura also black. The opercula in typical specimens are considerably broader than long and are usually dark brown or blackish, though variations run toward larger opercula which are also lighter in color. The uncus of the genitalia is slender when viewed from the side, tapers apically and is slightly swollen in the center.

Habitat.—From Nova Scotia and Lake St. George, Quebec, westward to Wisconsin and Iowa and southward to Washington, D. C.; mid-August to mid-October.

This form probably occurs throughout the northern United States east of the Mississippi River.

Cicada linnei nov sp

Length.—♀, 31-34 mm., to tip of wings 45-50 mm., ♂, 29-33 mm., to tip of wings 44-48 mm.

This species has been regarded as the *tibicen* of Linnæus. Typical specimens are widely different from specimens typical of *canicularis*, but occasional examples occur which are almost intermediate and are difficult to place correctly. In the large number of both species before us, however, the few such forms compared with the large number which are recognized at a glance leaves small room for doubt as to there being two species. *Linnei* differs from *canicularis* chiefly as follows: By the greater size of the individuals and the more prominent eyes; by the thoracic markings, the component parts of the pattern of which are not so closely set as in *canicularis*, thus showing a greater amount of the green background; by the comparatively larger size of the basal spots of the abdomen of the male (there are none in the female); in the greater comparative length of the second abdominal segment of the male, and in the longer opercula, which are usually as long as broad and almost always light in color. The genitalia are like *canicularis*.

There are a few male examples in the series before us which lack the pruinose spots at base of the abdomen, but these seem to have been in alcohol, which causes the disappearance of such spots.

Habitat.—This has probably the same range as *canicularis;* specimens before us show its occurrence from Boston, Massachusetts, westward to Michigan and Illinois, and southward to Tennessee and Black Mountains, North Carolina, early August to mid-September.

Cicada davisi nov. sp.

Length—♂ and ♀ 29-31 mm., to tip of wings 42-45 mm.—Head black, anterior margin betwen the eyes and clypeus and a spot in the center of the clypeus green. Pronotum including posterior and lateral margins green except for a single pair of black marks which begin at the anterior margin immediately behind the eyes, become suddenly broad, then taper posteriorly, but do not join as usually do the corresponding marks in *canicularis;* the dilation also begins much farther from the anterior margin, which in *canicularis* is so close as to be separated only by a narrow line of green; the space between the pronotal sulcus and the posterior margin is much longer than in *canicularis*. The mesonotum has markings similar to *canicularis*, but the median posterior spot is much shorter, leaving a broad space of green; the two lateral pairs of marks are fused together. The abdomen is black, without white spots at the base. Beneath it is

pale yellowish, probably pruinose in fresh specimens, with a narrow black portion in the center and the pleura also are sometimes black. The opercula are about as broad as long, rather convex and uniformly pale yellowish in color. The uncus of the genitalia is stout and dilated subapically.

Types: ♂ and ♀, in the collection of the New Jersey Experiment Station; co-types in U. S. N. M., and Acad. Nat. Sci., Philadelphia.

Described from five males and three females; Anglesea, N. J., August 25th; Paterson, N. J., September 4th; Miami, Florida, August 13th, Georgiana, Florida.

This is a very distinct species hitherto confused with *canicularis*. It may be separated at once from that species by the greater width of that portion of the pronotum posterior to the transverse sulcus, by the shape of the black marks on the anterior portion of the pronotum and by the comparatively narrow black central portion on the under side of the abdomen.

Cicada marginata Say.

This, the remaining species of *Cicada*—using the term within generic limits—in New Jersey, is so distinct from anything else that a detailed description of it at this time is unnecessary. It may be recognized by its large size, averaging over 40 mm. to tip of abdomen, and over 60 mm. to tip of wings, and its exceedingly robust form. The thoracic markings illustrate the general type of maculation, and the body above as well as below is largely pruinose. The opercula of the male are broader than long, pale green covered with white, pruinose and the anal abdominal segment below is considerably broader than long. The male genitalia are chunky, with the uncus knobbed at the apex.

It occurs commonly in the southern portions of New Jersey, more rarely northernwardly, and is recorded from New York to the Gulf States and as far west as Utah.

Plate III, figures 7 and 8, illustrate the genitalia of a Mexican species of Cicada, which we have not attempted to identify and present merely to show the variation of the structure in the genus. The specimens were sent from the U. S. N. M., with the *tibicen*, and were labelled *C. opercularis* Oliv., which, of

course, they are not. It probably represents a new species.

In Plate 1, figure 10, we figure the genitalia of *Tibicen novaboracensis* Emmons, a distinct and well-marked species and not a synonym of *rimosa*, as Uhler contends. It may, however, prove to be the same as *T. canadensis* Prov., upon further study. The specimen was taken in the Catskill Mountains, July 6th, by Mr. R. F. Pearsall and kindly given us.

Studies of Thecla irus Godart and T. henrici Grote and Robinson.

By Henry Skinner.

In this journal, page 45, Vol. 18, I stated my belief that these two names represented one variable species. The statement made there has brought me additional material and has led me to again investigate the subject. Having been an ardent collector in the field for many years, and also having accumulated a large lot of material and also having determined many specimens for others, I have never been able to make out two species, one for each of the above names. *Henrici* is described in the Trans. Am. Ent. Soc., p. 174, Vol. 1., 1867. The habitat is given as from "Atlantic District (Maine! to Pennsylvania!)" a specimen from Maine is mentioned "which does not differ from a number of specimens from the vicinity of Philadelphia, except in that the secondaries show a very few white scales, very narrowly arranged, edging the secondaries linearily along external margin." They also say, "This species is intermediate between *Thecla augustus* Kirby (*T. augustinus* Westw.) and *Thecla irus*, as illustrated by Boisduval and Leconte, and is apparently associated geographically with the former." It would, therefore, seem logical to think that *henrici* was believed to be a new species because it differed from the figure of *irus* given by Boisduval and Leconte. I do not believe that the authors knew any *T. irus* in nature. As *Thecla irus*, Boisduval and Leconte, Hist. Gen. des. Lep. et des Chen., pl. 31, figs. 5 and 6, give a somewhat crude representation of a butterfly that has rather a wide distribution over the United States. The figures show a somewhat larger butterfly than the *henrici*

of Grote and Robinson, and they say *henrici* is smaller than *irus*. Coleman T. Robinson presented his collection to the American Museum of Natural History, in New York. Mr. William Beutenmuller, curator of entomology of the institution, published a list of the types in the Robinson collection,* and records that of *T. henrici*. While I had very little doubt of the identity of *irus* and *henrici*, I wished to have a specimen compared with the type and also have certain questions answered in relation to it. Mr. Beutenmuller has very kindly sent me the following information:

"The type of *henrici* is apparently a female (body missing). It has no stigma on the upper side of the forewing. It has tails on the hind wings like your Nos. 1, 2, 3, 4. Our type agrees with your No. 1 in color and markings on the upper and under sides, except that your specimen has a little more white on the line on the forewing beneath. It expands 27 mm. It is absolutely the same species as your No. 1. The locality is Philadelphia, and labeled *henrici* G. & R. in Robinson's handwriting. It is from the Grote and Robinson collection."

It will be noted that the type came from Philadelphia. If there are two species of *Thecla* found here that might be designated as *irus* and *henrici*, I have failed to discover the fact. It will be interesting to see what others think of the two. Wherever there is great lack of unanimity of opinion, the validity of species is open to question. Mr. W. H. Edwards, in his Catl. of Diur. Lep., published in 1877, puts *henrici* as a variety of *irus*. In his Catalogue of 1884 he lists it as distinct from *irus*. Strecker (1877) puts it as a variety of *irus*, and says, "smaller. Inferiors tailless." S. H. Scudder, in his Butt. East. U. S. and Can., puts *henrici* as a synonym of *irus*. J. H. Cook, Can. Ent. page 216, 1905, contends that *irus* and *henrici* are distinct species. There are others who have written on the two names, but have probably not investigated them. In the above we see *henrici* as a valid species (Cook), as a variety (Edwards), and as a synonym (Scudder).

In size the species (*henrici-irus*) varies considerably. The largest specimen I have measures 33 mm. (♀) in expanse, and

*Bull. Am. Mus. Nat. Hist., Vol. IV., p. 59.

the smallest 27 mm. Thirty mm. is about the average size. The male, figured by Bd. and Lec., measures 33 mm. and the female 36 mm. I have not seen any specimens with so great an expanse, although I have a number from the Southern States. The size given by Bd. and Leconte probably represents artists' license. All measurements are from centre of body at base of wing to tip, doubled. The color above varies from light greyish brown to dark brown and fuscous. Individual specimens have varying amounts of chestnut brown on the wings, from the merest trace on the secondaries at the angle of the wing to the whole upper surface of both wings entirely chestnut brown. Some have the discal areas chestnut brown, and in some the outer halves of both wings are of this color. This variation is also seen in *niphon* and *augustus*, and is common in the females. It has no specific value, and is so variable as to be of little use in constituting a variety.

The stigma. This is a male secondary sexual character that occurs in some males and not in others. This not only applies to *irus-henrici*, but to some other species in the genus. It has no generic or specific value, and is simply an individual variation.

The under side of primaries. We have here a line running from the costa to the first median nervule. It is also very variable and it has no specific value. It varies as to distinctness, and in some specimens it is obsolete. In some cases it is a straight line; in some, interrupted in the middle, and in some, it is as described by Cook, a series of short dashes. It has no specific value and no proper correlation with other so called specific characters given by Mr. Cook.

The under side of the secondary wing is also divided by a more or less distinct line running from the costa to the inner margin. At the costa and at the termination of the line, it is generally white, and between these points the white is very variable, in some cases an entire white line from costa to inner margin. In some cases it is more or less obsolete. Some specimens have a small basal area of gray (see fig. of Bd. and Lec.), and in some the entire inner half of wing is unicolorous and the intensity of color in this varies greatly, being in some cases light brown, and in others almost black. Cross-

ing the wing in the centre of the outer area (the area beyond the mesial line) is a more or less distinct row of spots. The hind wings have a small tail. In specimens from Texas there is almost no differentiation between the outer and inner half of the wing by the mesial line, and this line on primaries is more or less absent. There is no correlation between any of these characters given above.

Thecla arsace Bd. Lec. is the same species as *irus*, the differences being varietal only. The figure is very poor, but I have some specimens agreeing with the description. It is a large Southern variety.

Distribution of my specimens.—New Hampshire; Lonsdale, R. I., iv. 27; v. 2; Johnston, R. I., v. 12, v. 26; Philadelphia, Pa., v. 4; Clementon, N. J., v. 7; Almonessen, N. J., iv. 28; Westville, N. J., v.; Anglesea, N. J., iv. 26; Falling Spring, Ill., iv. 12; Cincinnati, O., iv. 15, v. 20; St. Louis, Mo., iv. 21; Round Mountain, Texas; ii. 25, iii. 25; North Carolina; Louisiana. I have not seen any specimens from Canada, and would like very much to have specimens from the North and the Pacific Northwest. Sufficient allowance has not been made in our studies for individual variation. There are certain kinds of variation, individual or varietal, and other kinds specific. The basal area on the underside of secondaries of *irus* varies wonderfully in color and is a common type of individual variation in butterflies. A similar variation is seen on the upperside of *Argynnis cybele*, where the inner area is almost completely suffused with black. Numerous specimens and accurate data will elucidate many problems that confront us, brought about by the lack of material and data of the early students and writers. From the evidence before me I am convinced that *Thecla irus* and *henrici* are one species.

MR. W. H. VOLK, who has been conducting experiments for the University of California against the codling moth in Watsonville, has been appointed joint entomologist of Santa Cruz and Monterey Counties.

H. J. QUAYLE has returned from the Iowa State Agricultural College and has accepted the position of Field Assistant in Entomology in the University of California.

The Dipterous Genus Scellus, with one new Species.

By J. M. Aldrich, Moscow, Idaho.

This small genus, with *Hydrophorus* and *Liancalus*, forms a distinct subfamily of the Dolichopodidæ, characterized by having the last section of the fifth vein shorter than the posterior crossvein, the hairs of the back of the head below forming a scattered beard (instead of a ruff in a single row bordering the eye), and hypopygium directed backward or downward, not turned forward under the venter.

Liancalus is readily distinguished from its near relatives by having slender fore femora and elongated fore coxæ. The difference between *Hydrophorus* and *Scellus* is not very striking when written down, but easily recognized in nature. *Scellus* has long spines on the under side of the fore femora, and distinct, narrow longitudinal lines on the thoracic dorsum; *Hydrophorus* has only small spines on the under side of the fore femora, and the dorsum unmarked with lines, or with very slight ones. The species of *Hydrophorus* always frequent the edges of water, and are often seen running over its surface. *Scellus*, however, is never seen at water, but is found on bark of trees, on the ground, or in grass (exceptionally, perhaps on stones).

Only six North American species of *Scellus* have been described, to which another is added in the present article.

Scellus virago new species.

Large species, with yellowish-brown wings and greatly elongated antennæ, with apical arista.

Male. Head densely yellowish-brown pollinose, the face more ochre yellow; eyes elongated vertically, the face slender; about eight black bristles behind the eye above, and a pair on the occiput; antennæ inserted high up, as long as the vertical diameter of the eye, slender, the third joint nearly twice as long as the first two, with a short, two-jointed, apical arista.

Thorax thickly dusted, still with a faint coppery or rosaceous reflection showing through on dorsum and sides. Pollen of the dorsum grayish in the middle, with two very fine lines in the center, enclosing the single row of six or eight tiny acrostichal bristles; dorsocentral

bristles in two rows, very small, except the posterior two of each row, with slight dots from which the separate bristles arise; along each side of the dorsum a darker pollinose stripe above the pleural suture; before the scutellum a median darker stripe, continuing the two fine median lines to the scutellum (the insertion of the pin prevents my describing this more closely); scutellum more bright coppery red, with two bristles; pleura uniformly and densely pollinose with grey, the coppery ground color but little visible. Halteres yellow.

Abdomen less pollinose and more coppery than the thorax, of four well-developed segments, the others modified; fourth segment one-third as long as the preceding one; the "anal appendages" arise on the dorsal side, between the fourth and fifth segments—they are a pair of delicate organs, black at base, whitish beyond, each ending in a spoon-shaped, orange-colored enlargement, which bears a dense series of small, dark hairs along the outer side and a tuft of similar ones on the inner apical angle; third abdominal segment protuberant below, the grasping organs of the hypopygium projecting behind it.

Legs blackish-green, somewhat pollinose, of complicated structure. Fore femora with the usual spines beneath; fore tibiæ with a row of stiff hairs on the inner side beyond the middle and a stout thumb-like curved claw on the anterior side before the end; also, with a striking lobe or lappet on the inner side of the tip. Middle femora slender, a little arcuated; middle tibiæ with a row of erect bristles on the anterior side past the middle, and curled long hairs on the posterior side at the tip. Hind femora, tibiæ and tarsi of plain structure, the tibiæ without noticeable bristles at the tip.

Wings brownish-yellow on the basal half, more brown apically; a large brown spot on the posterior crossvein and another on the arcuation of the fourth vein, before and beyond the latter vein is widely bordered with yellow. Length, including appendages, 7 mm.; of wing, the same.

Female. Antennæ much shorter, the third joint only a little longer than the other two, arista apical, a little longer than in the male. Abdomen of five equal segments. Legs destitute of striking modifications, however, the spines under the fore femora are as large as in the male. Wings as in the male. Length, 7.2 mm.

The type is a male, collected by myself, October 11, 1905, in the salt marshes nearest to Palo Alto, Cal. It was stalking over the ground in a bare spot, and looked more to me like a Tipulid than anything else.

I have also a male and a female cotypes, collected in the same vicinity by R. W. Doane, on October 11, 1906. He studied the courtship of the species at that time. (*Vide posteà*, page 136).

NOTES ON THE DESCRIBED SPECIES.

Scellus exustus Walk. This large, black species is so striking that there can be no doubt that it was the one described by Walker, although he mentioned only a few of its characters. I have specimens from Brookings, South Dakota, Montana, and Moscow, Idaho. I have only collected it in beating about the grass of low meadows, and have never seen a specimen before I got it into my net; hence, I do not know its exact habitat.

Scellus avidus Loew. This I have only seen in a set of specimens given to me by Professor Wm. M. Wheeler, collected by him September 11, 1895, on Hunter's Creek, Wyoming. The type locality was Fort Resolution, Hudson's Bay Territory. It is one of the larger species, the tooth on the anterior side of the fore tibia is near the base; the ribbon-like anal appendages are white, blackish at base and tip, with a tuft of brown hairs on the end of the black, spoon-shaped apical part.

Scellus spinimanus Zetterstedt. This European species was recognized by Loew in material from Fort Resolution, Hudson's Bay Territory. As far as I know, no one has seen it from North America since. It should be easily recognizable.

Scellus monstrosus O. S. I examined a male of this species in the University of Kansas collection, captured at Estes Park, Colorado; it is the only specimen I ever saw. The type locality was British Columbia. It has many characters in common with *virago,* differing in the antennal structure and in having a long, curved spine at the apex of the hind tibia, etc.

Scellus vigil O. S. Type locality, Webber Lake, California, "resting on stones on hillsides." No other species of the genus is known to rest on stones, and I found this rather common ten years ago in the vicinity of Moscow, Idaho, on trunks of pine trees; hence, I am a little doubtful about the data of Osten Sacken. I also got the species on the side of the university building, however. It is a small species, with pale wings. I have got no more specimens for some years now.

Scellus filiferus Loew. I collected this at Custer, South Dakota, on pine trunks, and near Moscow. Idaho, in the same

situation. It was not common in either locality, and I have not found a specimen in ten years.

I wish the few remarks above about the habitat of species of this genus might interest collectors in scanning trunks of trees more closely. Not only *Scellus,* but *Medeterus* and *Neurigona,* of the Dolichopodidæ, are found there, as well as flies of other families.

Students of secondary sexual characters could not find a more interesting group than *Scellus;* for lack of space, I have not half described the peculiarities of the male in *virago,* and all the species have nearly as many male characters.

TABLE OF SPECIES OF SCELLUS, BASED ON THE MALES.

1. Third antennal joint elongated, with apical arista . . . . **virago** n. sp.
   Third antennal joint not elongated, with dorsal arista . . . . . 2.
2. Hind femora greatly thickened and arcuated, wings wholly blackened. **exustus** Walker.
   Middle femora arcuated, thickened towards the middle, wings not entirely blackened . . . . . 3.
   Middle and hind femora not arcuated . . . . . **avidus** Loew.
3. Apical half of the wings black, thorax above with snow-white pollen. **spinimanus** Zetterstedt.
   Not as described . . . . . 4.
4. Anal appendages terminating in spoon-shaped, orange-colored enlargements . . . . . **monstrosus** Osten Sacken.
   Anal appendages not enlarged at tip . . . . . 5.
5. Hind femora along the middle with abundant, long white pile . **vigil** Osten Sacken.
   Hind femora without white pile . . . . . **filiferus** Loew.

Notes on the Habits of Scellus virago Ald.

By R. W. Doane, Stanford University.

The broad salt marshes bordering San Francisco Bay near Stanford University are for the most part covered with the common salt grass (*Salicornia ambigula*), but here and there are larger or smaller spots entirely devoid of any vegetation and glistening white with a thin encrustation of salt. These are favorite places with many of the insects that live on the marsh, seeming to be a sort of general rendezvous, where they can bask in the sun, carry on their courtships or build

nests in the sand or clay, and, incidentally, be killed or eaten by their larger or stronger neighbors.

While collecting on one of these places in October, my attention was attracted by the peculiar actions of a long-legged fly which was running nervously over the ground. Its movements were all quick and jerky, running three or four inches, then stopping and spreading the wings out horizontally and folding them over the back again, repeating the operation several times in rapid succession, sometimes squatting low, sometimes rising high on tip-toe. Sometimes it would fly short distances, but always on alighting would go through these same jerky movements. Now and then, in its running about, it would come close enough to one of the little *Agromyzids* (*Rhicnoessa parvula* Lw.), that were quite abundant here, to pounce upon it and suck its blood. The unfortunate little fly is held and manipulated by the fore-legs of its captor, and after being turned over a few times, evidently in order that the blood may be sucked from different parts, the empty skin is dropped to the ground and blown away by the wind, while the vampire goes in search of another morsel.

While watching one of these flies, which proved to be a female, she seemed suddenly to become very much excited, now squatting low, now rising high and waving the wings frantically. The cause of this extra excitement was a male fly which, unnoticed by me, had approached to within a few inches of the female. He seemed to be paying but little attention to her, but was running about much as she had before he appeared. He gradually worked near her, however, and for some little time they stood facing each other, going through the curious performance of raising and lowering their bodies and waving the wings frantically. The male then turned away and seemed about to leave, but the female quickly flew in front of him again and began her antics. Several times this was repeated, the male sometimes flying away for a considerable distance; but whenever he came near the female, again she would run in front of him and begin waving her wings. Finally the female flew directly to the male, and I think that copulation took place, although I could not tell

definitely. The male then flew away, not to return while I was watching. This same performance, with slight variations, was seen to take place between four different pairs of flies; but only in the first instance did copulation take place.

As in many other of the Dolichopodidæ, the males of this species have very striking sexual characters, enabling the sexes to be easily recognized, even at some little distance. The long, ribbonlike anal appendages are reddish or orange-yellow, somewhat twisted, and with the tips broadened or spoon-shaped, making, indeed, a very conspicuous flag or pennant. The fore tibiæ are somewhat enlarged and furnished distally with a large, blunt protuberance. The spines on the distal half of the middle tibiæ tend to become more curly until toward the end there is quite a tuft of curly hairs.

According to observations made by Dr. Aldrich and others on other species of Dolichopodidæ (American Naturalist, 1894, page 35) and according to Darwin's theory of sexual selection, we would expect the male of this species to parade these sexual adornments before the female to attract or excite her. While it is probable that they may serve as recognition marks, enabling her to distinguish a male from another female, they are certainly not paraded before her for this purpose, as in other species. On the contrary, the male seems to take no particular interest in the courtship carried on so aggressively by the female, allowing her to make nearly all the advances. In a few instances the male would alight in front of the female, but seemed to make no effort to display his charms, nor would he begin the rythmical vibration of the wings until the female had evidently in this way first attracted his attention.

Dr. Aldrich identifies this fly as an undescribed species of *Scellus,* and describes it under the name of *Scellus virago.* (*Vide anteà,* page 133.)

PROFESSOR ARTHUR B. CORDLEY recently paid a visit to California, where he attended the Hanford Fruit Growers' Convention.

THE fruit growers of Southern California have asked Dr. Howard to delegate some one to investigate the fumigation of citrus trees in that part of the State. This is a very important work, involving interests amounting to very large sums.

Annotated List of the Species of Chrysops occurring in New Jersey and Descriptions of two New Species.

By ERICH DAECKE, Philadelphia.

(Plate VI.)

Since the publication of the New Jersey State List of Insects, by Prof. John B. Smith, in 1899, in which were recorded sixteen species of *Chrysops*, the number of species in this genus has been more than doubled. The local interest taken in this genus, as well as in other genera, families and orders, can be traced directly to Prof. Smith's list, which not only served many local collectors as a check-list, but stimulated their work to no small degree. It indicates the value and even the necessity of State lists.

The wing picture is an excellent differentiating character in the genus *Chrysops*, hence I have figured the wing of every species so far collected in New Jersey, avoiding extreme and perplexing forms which at times will occur.

The figures are three-fold enlargements from average wings, and the difference in size of figures gives the relative proportion between the species. All the figures represent the wings of females.

1. **C. excitans** Walker.

One specimen out of a large series from Bamber, v, 27, has anal cell open. The yellow on sides of abdomen extends to the third, rarely the fourth, segment on the South Jersey specimens. Mr. William T. Davis has collected *excitans* at Lakehurst, VI, 15.

2. **C. celer** Osten Sacken.

Common everywhere, from middle of May to beginning of July. Specimens worn by flight often lack the characteristic fulvous pile on pleura, and are easily mistaken for *mitis*, and if such specimens happen to have the fifth posterior cell entirely hyaline, as I have occasionally found on some specimens of *celer*, as well as on some specimens of *carbonarius*, they may also be mistaken for the latter. The broad and spatulate grayish-white space between the facial callosities of *celer*, which is narrower on *mitis* and almost linear on *carbonarius*, will be of value. The difference of infuscation on

second basal cell also serves well as a differentiating clue. See figures.

3. **C. carbonarius** Walker = **fugax** O. S.

Not rare in South Jersey. The extreme dates of my captures are Lacy, V, 27, and Da Costa, VI, 15. Miss Ricardo has placed *fugax* O. S. in the synonymy after examining the tion, but the student not familiar with this species must necessarily read the description of *fugax* O. S. to understand what *carbonarius* Walk. is supposed to be.
"Type of Walk., carbonarius in Br. Mus. collection."

4. **C. mitis** Osten Sacken.

Two specimens, one in Mr. Harbeck's collection, Jamesburg, July 4th; another in my collection, Brown's Mills Jc., June 25th. These two specimens are smaller than the normal *mitis* and may possibly be freaks of *celer*, though, according to all recorded characters, they belong to *mitis*. The eyes of these two specimens are like those of *celer*, that is, with shaft present. I have examined the eyes of Baron Osten-Sacken's type of *mitis* in the Academy collection, and they correspond with those of *carbonarius-fugax*, that is: shaft absent. See Plate I, ENT. NEWS, Vol. XVII.

Mitis is very closely allied to *carbonarius* and may possibly be a variation of same. Mr. Whitney writes me: "The typical *mitis* is extremely rare here (Milford, N. H.), although *fugax* is abundant in variety almost to the *mitis* type. I have no faith in their separateness."

5. **C. cuclux** Whitney.

Only recorded by Mr. A. J. Weidt from the Orange Mountains in May.

6. **C. niger** Macquart.

Common everywhere, May 12th-July 4th.

7. **C. brimleyi** Hine.

This species appears about the end of May and is a typical pine-barren insect.

8. **C. amazon** Daecke.

This species is rare, even in its type locality. Brown's Mills Jc., end of June—beginning of July.

9. **C. nigribimbo** Whitney.

About the end of June till September, all through the pine barrens.

10. **C. plangens** Wiedemann.

This species is common along salt marshes. Anglesea, May 28th, Newark meadows, June, A. J. Weidt. Staten Island, June 3-10, Wm. T. Davis.

11. **C. fallax** Osten Sacken.

Locally common. Wenonah, June 22; Jamesburg, July 4th.

12. **C. moechus** Osten Sacken.

I have never seen this species in numbers, but Mr. Harbeck records it to be the most common species near Trenton about the first week in July.

13. **C. univittatus** Macquart.

Locally a pest along the edges of woods. My extreme data are from Wenonah, June 14th to July 15th.

14. **C. bistellatus** Daecke.

This species I have only taken so far at its type locality, Brown's Mills Jc., from end of June to middle of July.

15. **C. indus** Osten Sacken.

Rare in New Jersey. I have only taken it at Clementon, from which locality it has been previously recorded by Mr. Johnson and Mr. Harbeck, May 10 to 15. Mr. Wenzel has taken one specimen at Almonessen, May 20th.

16. **C. vittatus** Wiedemann.

A widely distributed and rather common species. Brown's Mills Jc., June 24th; Wenonah, July 27th; Lucaston, Aug. 6th; Bamber, Sept. 1st.

17. **C. striatus** Osten Sacken.

This species is rare in New Jersey, and in local collections it is not uncommon to find *sequax* and *hinei* (a new species described in this paper) under the name of *striatus*. Delair, Aug. 7th.

18. **C. sequax** Williston.

The New Jersey specimens have a yellowish frontal callus, margined with black; the types from western Kansas are described as having a black frontal callosity. There is no other perceptible difference. Wenonah, July 27th.

19 **C. lugens** Wiedemann.

The only two New Jersey specimens on record were collected by Mr. Harbeck at Trenton, July 5, 1906. This species belongs to the Southern Atlantic and Gulf States, where it appears to be smaller and darker.

C. lugens var. *morosus* Osten Sacken.

Bamber, July 9; Tom's River, July 12; Newbold, ♂ ♂; July 14, ♀ ♀, July 21. Baron Osten-Sacken was familiar with Dr. Wiedemann's description of *lugens* when he described his *morosus* as a new species, and stated in his Prodrome, page 394, that he had never seen *lugens*. These two forms are apparently distinct; the descriptions bear this out, but Prof. James S. Hine has in his collection the complete chain of intergrades, hence *morosus* must be considered a variety of *lugens*. The wing, Fig. 19, answers for both forms, *lugens* and *morosus*. While studying these forms I collected more than 125 specimens, with the result that two new species were separated from this group, of which a table may read like this:

lugens, abdomen brown, one yellowish longitudinal line.
lugens, var. *morosus*, abdomen brown, three brownish yellow stripes.
parvulus n.sp., abdomen altogether brown.
hinei n. sp., abdomen orange, two blackish stripes.

20. **C. parvulus** n. sp. ♀.

Length 5½-7 mm. Face brownish-yellow; facial callosities, cheeks, and frontal callus black; front covered with grayish pollen. First antennal segment yellowish, second segment basally brown, the rest black. Frontal spot on eyes more or less excised anteriorly; occipital border separated from occiput. Thorax brownish-black, sparsely covered with whitish hair; two dorsal stripes barely recognizable cephalad, and this only in a certain light. Pleura brown, with two grayish stripes, the upper one indistinct. Abdomen uniformly brown, sparsely beset with whitish hair toward apex. Venter uniformly brown and glossy. Front tibiæ, except the base, also tarsi, dark brown; middle legs brownish-yellow, except the tarsi apically dark brown; hind legs, except base of tarsi, base of tibiæ, and apex of femora, dark brown. Wings: Costal cells and first basal, except a small spot near apex, brown; the crossband fills out the discal and fourth posterior cells, its distal convex border begins at tip of posterior intercalary and

touches the first longitudinal. The apical spot scarcely reaches the third longitudinal. See Fig. 20.

Described from 98 specimens taken at Bamber, N. J., July 9, '06; one specimen, Tom's River, July 12, '04; two specimens from Jamesburg, N. J., July 4th, collected by Mr. Harbeck, and one specimen from Lakehurst, N. J., collected by Mr. W. T. Davis.

The specimens referred to by Baron Osten-Sacken at the end of his description of *C. morosus,* Prodrome, page 390, undoubtedly belong to this species. He writes: "Two females and a male, also from Maryland, are smaller, abdomen altogether brown, front tibiæ, etc., etc. I am doubtful whether they belong here."

This species would appear to be in line with the variations of *lugens.* Hypothetically, *lugens* would be the intermediate form between *morosus* and *parvulus,* but I have taken the extremes, *morosus* and *parvulus,* in great numbers at the same date and place, Bamber, July 9th, while *lugens* could not be found. Besides, I offer the following comparative diagnosis as proof of their separateness:

parvulus,

Size 5½–7 mm. Occipital border of eye not connected with occiput. Frontal spot more or less excised anteriorly (see fig. and variations of frontal spot). Thoracic stripes barely visible. Abdomen uniformly brown. Apical spot of wings scarcely reaches third longitudinal. Hind femora and tibiae dark brown, except extreme section of knee.

lugens and *morosus.*

Size 7–8½ mm. (The two N. J. specimens of *lugens* are 7¼ mm.) Occipital border of eye connected with occiput. Frontal spot filled out. (See fig. and variations of frontal spot.) Thoracic stripes very distinct, abdomen striped (*lugens* one stripe; *morosus* three stripes). Apical spot exceeds third longitudinal. Apical third of hind femora also tibiae yellowish;

21. **C. hinei** n. sp. ♀.

Length 7½-8½ mm. Face, facial callosities, cheeks, and frontal callus yellow, the latter at times narrowly margined with brown. Front dark brown, with grayish pollen. The brown shining ocellar tubercle prominent. First antennal segment yellow-ferruginous, second reddish-brown, third from brown to black. Thorax and scutellum brown.

The greenish gray middorsal thoracic stripes narrowly separated, the lateral stripes yellowish-gray and more prominent in color. Two yellowish-gray stripes on pleura. Abdomen orange, with two longitudinal, well-defined brown stripes, which meet anteriorly at the scutellum and posteriorly at the fifth segment. Apical portion of abdomen tinged with brown. Laterally at base of third and fourth segments a brown spot each as if indicating an omitted stripe. Some specimens show an indistinct, pale brown lateral marking on first and second segments. Venter orange, blackish at tip, one narrow indistinct brownish stripe laterally and a broad central stripe reaching from tip to third segment. Legs yellow-ferruginous. Fore tibiæ, except base and tarsi brown; distal portion of middle tibiæ and tarsi, brown; hind femora basally, hind tibiæ and tarsi apically brown. Wings: The costal cells, first basal, discal, and fourth posterior cells infuscated. This infuscation is unbroken to the outer margin of crossband, which begins at tip of posterior intercalary and extends convexly to first longitudinal. The apical spot fills out the apex of wing, leaving but a narrow crescent for the hyaline triangle which widens posteriorly. See Fig. 21.

Described from seventeen specimens collected at Iona, Aug. 25, '02; Weymouth, Aug. 16, '04; Atlantic County, Aug. 7, and Lakehurst, Aug. 18, Prof. John B. Smith; Lakehurst, Sept. 3 and 16, Mr. Wm. T. Davis.

One doubtful ♂, collected by Mr. Harbeck, Sept. 7, '05, at Clementon, I refer to this species. Its general appearance, date of capture and locality point toward *hinei*, but I defer description to a later date awaiting more conclusive proof.

This species belongs to the *lugens-morosus* group, from which it is readily separated by the narrow hyaline triangle, the orange abdomen striped with black and the yellow callosities.

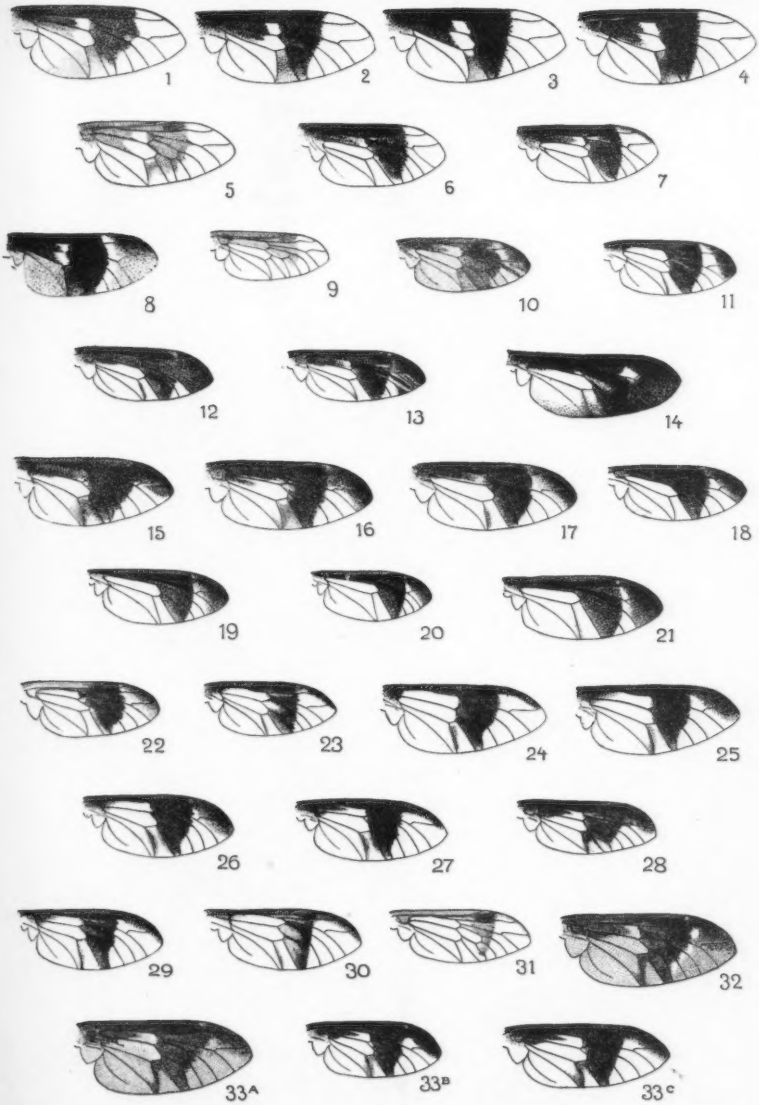
Named in honor of Prof. James S. Hine, who has added so much to the knowledge of this family.

22. **C. obsoletus** Wiedemann.

Not a common species in New Jersey. Fort Lee, June 23; Wenonah, June 22; National Park, Aug. 13.

23. **C. delicatulus** Osten Sacken.

The first New Jersey specimens I collected at Tom's River, July 12, '04, and considered a rare find, but since, I have taken it all through the pine barrens. It is a typical pine barren



1, *excitans*
2. *celer*
3, *carbonarius*
4, *mitis*
5, *cuclux*
6, *niger*
7, *brimleyi*
8, *amazon*
9, *nigribimbo*
10, *plangens*
11, *fallax*
12, *moechus*
13, *univittatus*
14, *bistellatus*
15, *indus*
16, *vittatus*
17, *striatus*
18, *sequax*
19, *lugens*
20, *parvulus*
21, *hinei*
22, *obsoletus*
23, *delicatulus*
24, *callidus*
25, *dimmocki*
26, *montanus*
27, *sackeni*
28, *frigidus*
29, *pudicus*
30, *cursim*
31, *fulvistigma*
32, *brunneus*
33a, *flavidus*
33b, *flavidus*
33c, *flavidus*

DRAWN BY E. DAECKE.

species. Brown's Mills Jc., June 25; Da Costa, June 29; Bamber, July 9.

24. **C. callidus** Osten Sacken.

This is about the best known species, it is generally distributed and may be taken from the beginning of June to the latter part of July almost anywhere.

25. **C. dimmocki** Hine.

Closely allied to *callidus* but has a broader apical spot. Anglesea, May 28; Iona, June 2; Cape May, June 7.

26. **C. montanus** Osten Sacken.

Rather local and nowhere common. Clementon, June 28.

27. **C. sackeni** Hine.

Da Costa, June 3; Brown's Mills Jc., June 17; Fort Lee, July 4.

28. **C. frigidus** Osten Sacken.

Dover, June 23, Johnson. This record is taken from Mr. Chas. W. Johnson's Supplementary List of Diptera from New Jersey, ENT. NEWS, May, 1904.

29. **C. pudicus** Osten Sacken.

Da Costa, June 24; Brown's Mills Jc., June 27, July 1. I have collected many specimens of this species, but never found intergrades between this and *cursim* Whitney. The orange abdomen and pale infuscation of the wings are always characteristic of *cursim*, though the eye maculations are identical in both. Should these two forms ever prove by the final test of breeding to be the same, the name *cursim* Whitney would even then be a convenient means of separating it as a variety from its allied form *pudicus* O. S.

Pudicus is not a common insect, only once I found it in abundance near cranberry bogs.

30. **C. cursim** Whitney.

This species is rare and inhabits particularly the pine barrens. Da Costa, July 4, 1901; Brown's Mills Jc., July 1, '06; Jamesburg, July 4, '05; Harbeck, Lakehurst, June 16, W. T. Davis.

31. **C. fulvistigma** Hine.

One ♀ specimen, Lakehurst, July 29, collected by Wm. T. Davis.

32. **C. brunneus** Hine.

One ♀ specimen, Cape May, Aug. 9, 1904; Newark, Salt Meadows, both sexes, July, A. J. Weidt.

33. **C. flavidus** Wiedemann.

A common species in June, July and August. This species is very variable in size, color and wing-maculation. See Figures 33 a, b and c. In looking over a large series I find that specimens from the salt marshes along the Atlantic coast also from the Delaware River front are larger, their wings have a smoky tinge all over, the brown design is rather pale, and the crossband wider (Fig. 33 a), in a measure resembling *brunneus*. Specimens from inland localities are, as a rule, smaller, with clear wings and dark brown maculation (Fig. 33 b and c), but there seems to be no character strong or constant enough to separate these two forms specifically.

Notes on some Species of Geometrids.

By JOHN A. GROSSBECK, New Brunswick, N. J.

The notes forming the present paper have been in the hands of the writer since early in 1906, and are primarily the result of Dr. Dyar's article in the Proc. Ent. Soc. Wash., Vol. VI, p. 222, under the heading "A Few Notes on the Hulst Collection." In going carefully over the Geometrid portion of the Doctor's paper, I find that he has unfortunately relegated several of Hulst's species to the synonymy erroneously. Two of his conclusions have already been questioned,* and as a result, it was believed that certain specimens examined by Dr. Dyar purporting to be types were not types at all. Such other notes as have suggested themselves in the course of this study have been added.

Hydriomena curvilinea Hulst.

Dyar says of this species: "This is the same as *H. occidens*

*Can. Ent. XXXVII, 61.

Hulst, the subbasal and outer transverse anterior lines being a little more distinct than in the type of *occidens."*

I have concluded, after close study, that *curvilinea* is distinct from *occidens* for the following reasons: the outer transverse anterior line in *curvilinea* is single, defined and edged inwardly by a whitish zig-zag narrow line, while in *occidens* the corresponding line is diffused, geminate and broad, becoming faint and the component parts merged together toward the center and inner margin of the wing, the whitish zig-zag line being wanting. In *occidens* a line beginning at the center of the costa and from thence outward and inward to center of wing is altogether absent in *curvilinea.* The outer line in both species is more or less broken and ill-defined, but at the costa it is double in *curvilinea* and single in *occidens.* These points are sufficiently strong to hold the species distinct in my opinion.

Hydriomena amorata Hulst.

Of the two types, one, a female, is probably *Petrophora defensaria* Guen. The other, which has both antennæ and the abdomen missing, but is otherwise in very perfect condition, is probably also a female. This is a different insect from *defensaria,* the entire median area of the primaries, between the intradiscal and extradiscal lines, being a bright reddish-brown, deeper in the center. There is not even a tendency in this direction in any specimens of *defensaria* I have ever seen. The name *amorata* will therefore hold, and while its generic disposition is a little uncertain, the character of the wing markings would place it in *Petrophora.*

Somatolophia umbripennis Hulst.

Of this species Dr. Dyar says: "The single ♀ type is *Alcis haydenata* Pack." This conclusion, Rev. Geo. W. Taylor would not accept, because in defining the genus of which *umbripennis* is type, Hulst gave characters which were possessed by the male only, and some of which were at variance with the genus *Alcis.* In this he was correct; *umbripennis* is not an *Alcis,* and therefore not *haydenata;* and while the character of the markings are precisely the same, the general color and the structure are quite different. I might say,

also, that the type in the Hulst collection is not a female, but a male, the antennæ of which are broken off; but sufficient of the segments are retained to show the long pectinations.

In the course of the study of this species I was at first inclined to regard both it and *haydenata* as one species, and neither as belonging to *Alcis,* for, under the latter, Hulst had two males, neither of which possessed the hair pencil on the hind tibia characteristic of that genus. They also had the same umber-colored wings, and the dorsal tufting of the abdomen ascribed to *umbripennis* was the only structure which separated them. This abdomen of the type appeared to be that of a female, and Professor Smith, to whom the specimen was shown, corroborated my opinion at once and also called my attention to the fact that the body belonged to some other insect. I afterward detached the body to demonstrate this point and found positive evidence of its having been glued on. This was done very neatly, as may be inferred when we consider that it passed through the hands of Hulst, Dyar, Pearsall and myself without any of us suspecting the truth.

After these two forms were combined I at first supposed that *haydenata* had no hair pencil, but specimens in my own collection showed this structure plainly; so the question arose as to which species Packard's types belong. These types are females, but judging from his description, "uniformly pale-reddish ash-gray," I do not think there can be any doubt but that he had the form with the hair pencil in the male. There are three male specimens of *umbripennis* before me, and none have the antennæ entire; but I assume that they have a simple apex. Thus, with the abdominal characters of *Somatolophia* eliminated, our species rests very comfortably in *Selidosema.*

Cymatophora festa Hulst.

Another conclusion of Dr. Dyar's is that "the single ♀ type [of *Cymatophora festa*] is *Deilinea pulveraria* Hulst," and he adds: "The name *festa* has priority, but should be referred to *Deilinea.*" Now, how Dr. Dyar came to say this I cannot even conjecture. The insects are so very different that the statement led Mr. Taylor to say, as he did of the former, that the specimen at New Brunswick cannot be the true type. That

it *is* the true type there is not a shadow of doubt, for it agrees, word for word, with Hulst's description of the species. Upon further study, however, I find *festa* to be the same as *Macaria aequiferaria* Walk., and it should be referred as a synonym to that species.

In this connection, I might also say that there are a few other apparent discrepancies which require explanation. In the Hulst collection under the name *Macaria quadrisignata* Walk., are four specimens which are exactly like *Cymatophora festa,* or more correctly, *Macaria aequiferaria.* Referring to Dyar's catalogue we find *quadrisignata* as a good species of *Macaria* (3679), and again, following Packard (Mono. Geom. p. 285) as a synonym of *Sciagraphia granitata* Guen. (3647). Thus, if we accept Dr. Packard's decision, who compared *granitata* with the type of *quadrisignata,* we must erase the latter from our lists as a species and leave it as a synonym of *granitata;* but should the specimens in the Hulst collection be the true *quadrisignata,* then it must be placed as a synonym of *M. aequiferaria.*

We have a somewhat similar case with *Macaria dispuncta* Walk., which is given specific rank in Hulst's classification (Trans. Am. Ent. Soc., Vol. XXIII, p. 331), and in Dyar's catalogue (3687), and in the latter also, again following Packard, as a synonym of *Sciagraphia granitata.*

Selidosema correllatum Hulst.

The two types of *Macaria correllata* (not *correllatum*), referred to *Sciagraphia granitata* by Dyar, have nothing in common with *Selidosema correllatum.* They were evidently labelled by Hulst with the intention of describing; but no description has appeared under that name so far as I am aware.

The two types of *Diastictis sericeata* Hulst are both females of *Selidosema correllatum.* The ground color of the former is very light in color, and thus the fine brown striations mentioned by Hulst in his description show up more prominently than in the latter. The outer transverse lines are also less curved in *sericeata,* being almost straight.

In Dyar's list *correllatum* is placed in the genus *Cleora,* but

I can detect no hair pencil in the male; neither is it a *Cymatophora* (= *Diastictis*), as the male antennæ are plumose.

The two types of the true *Selidosema correllatum* are not conspecific; the male, from Colorado, is darker, more heavily marked, and is the one from which the original description was chiefly drawn; the female, from California, is a white insect with broader wings and the outer margin of the primaries below the falcation is more produced. The Colorado type is, therefore, left to represent Hulst's species, and the Californian specimen is herewith described as new.

Selidosema pallescens n. sp.

♀.—Expanse, 26 mm.—Ground color, creamy-white, except the upper side of the primaries, which is white. Head, palpi, thorax and abdomen with a scattering of brown scales. Primaries with dark brown scales, sparsely and pale brown-ochre ones more numerously scattered over the surface, these latter forming small squares along the inner half of the costa. Basal line brown, broadest between costa and radius, and from there is incomplete to inner margin, where it is very dark brown. Median line visible only on costa, where it appears as a brown-ochre, squarish patch, which extends slightly into the discal space. Discal spot dark brown, transversely oval, situated at end of discal space. Outer space with two widely separated brown lines. The inner begins on the costa one-third from the apex and forms a slight S to inner margin; below radius 5 to immediately before cubitus 2 this line is very faint, but is otherwise broad and distinct. The outer line begins on the costa, midway between the apex and the inner line, and extends toward inner line to media 1 and then runs parallel with it to inner margin; this line is faint in the same place as the inner line, and is also much narrower than that line. In the space between these two lines there is a small brown spot just above media 3 and a little below this is a large patch, which extends to the inner margin. The marginal line shows only between radius 5 and media 3, where it appears as three black lunules. Fringes checkered brown-ochre and white. Secondaries with a scattering of brown scales along inner margin. Discal spot round, distinct. Marginal line broken; most obvious toward apex. Outer margin scalloped, each scallop tipped with pale brown. Beneath, the primaries have a scattering of ochreous scales, thickest at the costa and apex; the secondaries are peppered chiefly with brown scales, though also some ochre ones toward outer margin and at apex. Discal spot present on all wings.

Type: one female from California in the Hulst collection at Rutgers College.

Nacophora minima Hulst.

As Dr. Dyar suggests, *Gabriola dyari* Taylor is the same as this species. Mr. Taylor's generic description agrees perfectly with *minima,* so far as it would apply to the female sex.

It may be well to state, in conclusion, that the type of *Tephroclystia brunneipennis* Hulst=*Percnoptilota fluviata* Hubn. does not bear a *"Nyctobia"* label, but a *Nycterosca* label, the genus which was created for the reception of *brunneipennis,* when it was first described. This is merely mentioned to show that Dr. Hulst never considered it a *Nyctobia,* as would be inferred from Dr. Dyar's note.

The Classification of the Culicidae According to Scale-Vestiture Characters.

By Frederick Knab, Washington, D. C.

Plate VII.

While, perhaps, sufficient objection has already been made to the use, by Theobald and his followers, of the scale-vestiture of the Culicidae in classification,* it seems worth while to give a few illustrations of their worthlessness for such purposes. Even could the different writers agree, as is by no means the case, on the application of Theobald's terminology to the various forms of scales, the fact still remains that the shape of the scales gives no assurance whatever of the systematic position of the insect. Moreover, the scales show no fundamental differences of structure but only differences of form, and all intergrades occur between the scale forms indicated by Theobald for generic division. This question has been so ably discussed by James and Liston that it would be superfluous to enlarge upon it here, particularly as some of their remarks have already been quoted (Dyar and Knab, Jour. N. Y. Ent. Soc., Vol. XIV, 1906, p. 172-173). At the best the groups according to scale characters are unnatural and not in accordance with structures of primary importance. The truth is that very

* Theobald's classification has been condemned in the following writings which may have escaped English readers: Neveu-Lemaire, Classification de la famille des Culicidae, Mem. Soc. Zool. de France, Vol. XV (1902), p. 195-227; Donitz, Beiträge zur Kenntniss der Anopheles. Zeitschr. f. Hyg. u. Infectionskrankh., Vol. XLI (1902), p. 15-88.

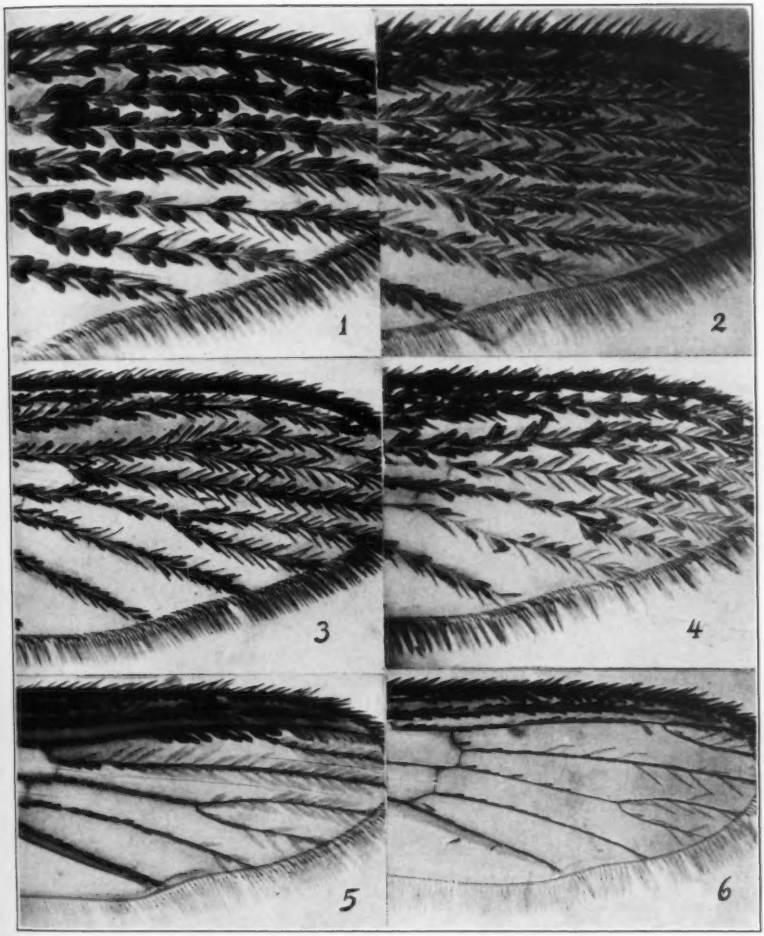
few tangible characters are available for generic subdivision in the Culicidae, and the bulk of the species must remain in a few large genera, regardless of the details of ornamentation. The well-marked divisions which are indicated by the larval characters and the male genitalia, and which coincide for both, are certainly fundamental. I will give only a few examples to illustrate how the application of Theobald's system of classification works out in practice.

The genus *Verrallina* was erected by Theobald in 1903 (Monogr. Culic., Vol. III, p. 295) for "*Aedes*" *butleri* and *niger* from the East Indies, and associated with them—apparently from want of a better place—*Aedes nigricarpus* from the Amazons. In 1905 it would seem Theobald was no longer able to recognize his genus and the same three species, in Genera Insectorum, fasc. 26, p. 35, follow *Aedes* under the heading "genus uncertain"—no mention of *Verrallina*. In 1906 *Verrallina* reappears in Coquillett's classification (U. S. Dept. Agric., Bureau Ent., Tech. Ser. No. 11, p. 17), and is applied to two new forms from tropical America; the *Aedes nigricarpus* is assigned, again with a doubt, to the new genus *Isostomyia*.

In the Canadian Entomologist, Vol. xxxvii, 1905, p. 231, Miss Ludlow describes *Taeniorhynchus sierrensis*, and in a later paper (l. c., Vol. xxxviii, 1906, p. 132) she acknowledges that her species is synonymous with *Culex varipalpus* Coquillett. However, a further study of its scale-characters convinced her that the species cannot be correctly placed in *Taeniorhynchus*, or in any of the numerous genera already recorded from North America and, without locating it generically, she associates it with *Finlaya*. Mr. Coquillett has recently placed the species in *Ochlerotatus*, which position agrees very well with the views arrived at by Dr. Dyar and the writer.

Again, what a carry-all the genus *Stegomyia* has been for species of all kinds that happen to have a similar thoracic ornamentation. It would lead altogether too far to point out the kaleidoscopic changes that this genus has undergone.

Perhaps the most striking example of the composite nature of the Theobaldian genera is furnished by his genus *Mansonia*.



CULICIDAE ACCORDING TO SCALE VESTITURE (KNAB).

1. *Mansonia fascipes* Coq.
2. " *signifer* Coq.
3. *Feltidia jamaicensis* Theob.
4. *Aedes squamiger* Coq.
5. *Uranotaenia sapphirina* O. S.
6. " *lowii* Theob.

This genus would seem to be an unusually well-marked one "whose chief distinctive character is the presence of large scales on the veins of the wings" (Monogr., Vol. ii, p. 173), yet it is of most heterogeneous makeup. Theobald in his first characterization of the genus (as *Panoplites*, l. c.) states that "the abdomen of the female is usually blunt," thus implying that his genus includes species in which the female abdomen is tapering. This difference is a fundamental one and certainly indicates different genera. Neveu-Lemaire (Bull. Soc. Zool. de France, xxxvii, p. 173), figures the receptacula seminis of *Mansonia uniformis* of India, and shows that there are two of these pouches in this species. Preparations of our American *Mansonia titillans* and *M. signifer* show three of these receptacula. Moreover, none of the many preparations of American mosquitoes of nearly all genera which I have had opportunity to examine show the same number indicated by Neveu-Lemaire for *M. uniformis*. With the exception only of *Anopheles*, *Megarhinus* and *Uranotaenia*, which have a single receptaculum seminis, all our American mosquitoes show three receptacula seminis.

Neveu-Lemaire states that the eggs of *Mansonia* are prolonged into a neck at one end, evidently drawing his data from an Old-World species. Of our American Mansoniads we know the eggs of *M. signifer* only, and these are covered by a film which projects in the form of a curious surrounding rim, unlike any other known mosquito eggs. We know nothing of the structure of the larvæ and male genitalia of the Old-World forms of *Mansonia*, but from the above data it is sufficiently obvious that the New-World species are not congeneric with them.

The accompanying figures of the wings of *Mansonia fascipes* Coq. and *M. signifer* Coq. offer a striking illustration of how misleading the wing-vestiture is which has been made the basis of the characterization of *Mansonia*. In spite of the great difference in the appearance of the wing-vestiture, the two species are very closely related, and by the structure, not only of the adults, but also of the larvae and the male genitalia, are congeneric. The larvæ of the two species are practically iden-

tical, even to the peculiar dark red color of their bodies. By the study of the superficial characters the relationship of *Culex signifer* with *Mansonia* was never suspected. The species was first described under *Culex*, then placed in *Stegomyia*, and then made the type of the genus *Pneumaculex*.

The genus *Grabhamia* was erected by Theobald for certain mosquitoes in which the wings bear light and dark colored scales of a certain type intermixed. Illustrations are here given of two species, *Feltidia jamaicensis* and *Aedes squamiger*, which, according to the wing-scales, are typical representatives of Theobald's genus *Grabhamia*. While these species are now both referred to *Aedes* they belong to separate well-marked groups, which, in a previous paper, Dr. Dyar and the writer have characterized as *Janthinosoma* and *Aedes*. These two groups are exceedingly well defined in the larval stage and in the male genitalia. However, as no good characters could be found for separating the females, they have been united, and, at the best, can only be recognized as groups of subgeneric rank; *Feltidia* again separating from *Janthinosoma* proper by the simple claws of the female. *Aedes squamiger* has been described by Miss Ludlow under the name of *Grabhamia deniedmannii*. Recently Mr. Coquillett has erected the genus *Lepidoplatys* for this species which has toothed claws in the female. The genus *Grabhamia* as defined by Mr. Coquillett is identical with the group *Feltidia* as above characterized.

The last two figures of the plate are added to show the inconsistency of the Theobaldian classification. According to scale characters these two species should be placed in separate genera, yet the relationship is so obvious by other characters that not even the boldest disciple of the scale-classification has presumed to separate them. The test of the value of such characters would lie in their consistent and undeviating application and such a test the system evidently will not stand.

I am under obligation to Mr. H. S. Barber of the National Museum for the photomicrographs from which the figures were made. The figures all represent the same portion of the wing so that a proper comparison can be made.

Cards for Data.

By Sidney C. Carpenter.

I was much interested in your editorial on pp. 25 and 26 of the January News in regard to modern aids in the work of entomologists. I enclose a sample of three cards that I am using, which may be of interest to some of your readers. In all three forms the name of the species is entered on the red line at the top.

Of course the requirements of no two collectors would be just alike, but special cards will be printed very cheaply by any manufacturer of card index supplies, and the first cost of a cabinet, which need not contain more than one or two drawers to start with, will be more than offset by the time and labor saved in keeping and referring to records.

I use Form 1 for each specimen in the mounted collection. The space at the right is for the date of the different stages, if the specimen has been bred. "Jo. No." is the Journal Number which I give to each set of eggs, caterpillars, etc., to enable me to keep track of their records.

Collection No. _____ Mounted _____

Name _____

Locality _____

Date of Capture _____ Bred: Egg _____

From _____ Cat. _____

_____ Pupa _____

_____ Imago _____

_____ Jo. No. _____

Remarks _____

Form 2 gives a graphic record of the life history. I have filled the card in with the record for *Vanessa antiopa*, and it is

self explanatory. The horizontal spaces are double, to provide for overlapping broods.

Name _____

Stage	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Egg												
Caterpillar												
Pupa												
Imago												

Food Plants _____

Remarks _____

Form 3 is used as a general list of species, and serves as a sort of "handy reference" in case I want data on any particular species. If it is represented in the collection I can tell at a glance, as the collection numbers are filled in the upper right hand corners.

Family _____ Coll. Nos. _____

Name _____

Locality _____

Food Plants _____

Literature _____

De Luxe Editions of Entomological Works.

By C. F. Baker.

Estacion Agronomica, Santiago de las Vegas, Cuba.

In late years I have been exerting myself to the utmost to interest American entomologists in the matter of possible better methods in entomological publishing. I have corresponded and talked with many concerning it, and they have all agreed heartily enough with me, though the point of *action* has not yet been reached. American entomological publications are primarily for American entomologists, are supported by them quite largely, the subject matter is contributed by them, and they can prescribe, if they will, the form that those publications are to take. That the present condition is an almost intolerable one in certain respects, I have partly brought out in an article in Entomological News entitled "Entomological Literature, the *bete noire* of the Entomologist."*

There are also other very striking features in connection with the matter which I shall bring out from time to time. One of the most remarkable, and one that should certainly set American Entomologists to thinking, is the present tendency towards the publishing of costly *de luxe* editions of works on groups in which there is absolutely no good reason for a *de luxe* setting, as there might be among some Lepidoptera, and in which this form frequently seriously interferes with the very purpose for which the work is intended.

As a concrete example of this allow me to cite Ashmead's synopsis of the Chalcids, recently published by the Carnegie Museum, an institution supposed to be primarily founded in part for the promotion of entomology in the interests of American entomologists. It was a great thing theoretically for this museum to have published such a work. Did it turn out, however, to the practical benefit of the mass of American entomologists? Let us examine it and see. It measures ten by thirteen and one-fourth inches and is one and one-fourth inches thick, and weighs *four pounds and six ounces.* It has three hundred and thirty pages, with about thirty-three lines to the page, the full printed pages carrying about four hundred

* Ent. News, Vol. xvi, pp. 264-270, Oct., 1905.

and thirty words and having *a blank margin of two and one-half inches.* Some of the pages must have been joy to the compositor, since they are rich in printer's "fat." There are nine plates of *merely outline drawings* which would have been far more useful inserted in the text, and could just as well have been so inserted and thus saved cost and weight. For this work we pay $6.00.

As nearly as I can estimate, if this book be translated into terms of a good, clean, well printed journal of normal size, like ENTOMOLOGICAL NEWS, it will occupy about three hundred and twenty pages. I take down the first volume of ENTOMOLOGICAL NEWS within reach (for 1894) and find that it measures six by nine and one-half by one inch, weighs fifteen ounces, and contains three hundred and fifty-two pages. It contains also twenty plates, of which one is finely colored,—a larger work than that on the Chalcids so far as *actual matter* goes and yet only about *one-third the size and one-fifth the weight;* it costs one dollar,—*one-sixth of the price!* It may be argued that the size and weight and price of the volume are of no moment to the great laboratories and libraries. But are not American entomological works published primarily for the *mass* of American entomologists,—men of small means,—men who must frequently move from place to place during their earlier years, men who must crowd much into busy lives of teaching and economic investigation or professional work, and who need "manuals" that are workable table manuals in more respects than in the mere name? Are such works to be intended as mere monuments by their size and worse than useless elegance to the institutions issuing them? A book of the size and weight and unwieldiness of this one on the Chalcids is a veritable "bull in the china shop" on the entomologist's work table! I maintain that the questions of actual utility, real usability, and availability to the greatest possible number of workers are points that must be considered in American entomological publishing; and I believe that such ideas were part and parcel of the original motives underlying the foundation of the Carnegie Museum, the Smithsonian Institution, the Field Columbian Museum, and other institutions of the sort. Surely the recommendations of such important organizations

as the various entomological societies of America will be heeded in the matter.

We need lists, synopses, and manuals that are thoroughly and really "manuable"—to adapt a meaningful Spanish word. Why can we not have scientific works gotten up on as good a plan as Oxford Bibles,—on thin, strong paper, with flexible covers, and with copious marginal notes and references. I would feel contented to pay even six dollars to get the synopsis of the Chalcids in the thoroughly usable and condensed form in which it might easily have been issued. But to be compelled to burden myself with this elephantine monstrosity, that is as different from what it should be to serve the very purpose for which it was intended as a solid-wheeled ox-cart is from a racing sulky, is enough to make one doubt the fitness of some things born of modern scientific activities. And over and above all other considerations, it fills one with regret to think how much more of important and needful work could have been put out within the same cost and space of this one unwieldy tome.

Considered from almost any point of view, what could be the benefits to any one in the absurd inflation of a book containing about the material of Cresson's Synopsis, and intended for a working manual, to the size of the bulky and costly tome under discussion. And we are unfortunately compelled to ask the same question about Wytsman's "Genera Insectorum" and a number of other otherwise extremely important general works being issued to-day. The ridiculous form in which such works are being issued compels small and costly editions of very limited circulation, whereas such works should surely be in the hands of every working student in the country.

It often seems as if public institutions of to-day considered it a most noteworthy event to issue a work as nearly as possible in the form of the ponderous and impossible folios of the seventeenth century. I will agree that such events are always as *noteworthy* as possible, but they are not praiseworthy! Is there not some publishing house or public institution that will break away from musty and antiquated traditions and give us entomological manuals—of which in days to come *the number will be legion*—in a practical, thoroughly usable form, really conforming to the needs of twentieth century workers?

ENTOMOLOGICAL NEWS.

[The Conductors of ENTOMOLOGICAL NEWS solicit and will thankfully receive items of news likely to interest its readers from any source. The author's name will be given in each case, for the information of cataloguers and bibliographers.]

To Contributors.—All contributions will be considered and passed upon at our earliest convenience, and, as far as may be, will be published according to date of reception. ENTOMOLOGICAL NEWS has reached a circulation, both in numbers and circumference, as to make it necessary to put "copy" into the hands of the printer, for each number, three weeks before date of issue. This should be remembered in sending special or important matter for a certain issue. Twenty-five "extras," without change in form, will be given free, when they are wanted; and this should be so stated on the MS., along with the number desired. The receipt of all papers will be acknowledged.—ED.

PHILADELPHIA, PA., APRIL, 1907.

SPRING sits in the lap of winter and at the present writing we have had but few indications of gentle spring. However, we have heard rumors of what some of us are going to do as soon as insects become active. One careful collector has his itinerary made out, and his dates are fixed by certain interesting captures that he has previously made. He will visit these places again and will doubtless be rewarded by rarities. The early insects are on the wing, and in the Lepidoptera now is the time to study the individuals from wintering chrysalids. What should we do at the commencement of the collecting season? Here are some of the good things to do: collect a lot of perfect specimens of each species as they appear; study individual variation; patronize the dealer in pin labels; study the life-history of some species. There are plenty of them about which we know little or nothing. Send your observations to the NEWS. Do not collect with a view of seeing how many named species you can get, but study your material and make the result known. Soon insect music will resound over the land, and as this is the age of insects entomologists should be up and doing.

Notes and News.

ENTOMOLOGICAL GLEANINGS FROM ALL QUARTERS OF THE GLOBE.

CORRESPONDENTS will kindly note that the address of Mr. John A. Grossbeck is Agricultural Experiment Station, New Brunswick, N. J.

I know that you know nothing.
Others know not even this.—*Socrates* (revised).

W. T. CLARK, until recently connected with the Entomological Department of the University of California, is now Professor of Entomology in the Alabama Polytechnic Institute at Auburn.

ADDITIONAL NAMES of persons willing to identify certain insects (see ENT. NEWS, February, p. 59, March, p. 105):

Charles A. Hart, Nat. Hist. Building, Univ. Illinois, Urbana, Illinois, Orthoptera.

J. Douglas Hood, Nat. Hist. Building, Univ. Illinois, Urbana, Illinois, Thysanoptera.

Dr. J. W. Folsom, Urbana, Illinois, Collembola and Thysanura.

G. Chagnon, Box 186, Montreal, Canada, exotic Buprestidae.

PHALANGID NOTES.—When in 1904 (Jour. N. Y. Ent. Soc., XIII, p. 253) I described *Caddo glaucopis* as new, I was unaware that the description of *C. agilis* Banks had been taken from immature specimens, that fact being published by Mr. Banks in the same number (p. 256). Mr. Banks has recently been kind enough to examine an adult specimen of *C. glaucopis* collected by me last June at Sandford, Ontario, and reports that it is the same as the adult of his *C. agilis*. I regret having made the synonym and take this opportunity to rectify the blunder.

I wish also to record here the capture last July at Carlton Station, Orleans County, New York, of an adult male of *Phalangium longipalpis* Weed, which, as far as I am aware, has heretofore been known only from Arkansas.—CYRUS R. CROSBY, Ithaca, N. Y.

BUTTERFLIES IN BATTLE.—"A battle of butterflies," said the Japanese Viscount firmly.

"Impossible!" cried the lady on his right.

"Oh," the Viscount insisted, "the thing is authenticated. It happened on August 20, 1889. Tales and poems without number have been written on it.

"On the evening of August 20th two opposing armies of the butterflies fought an aerial battle between Nojima and Kavasaki-Mura. The fight continued till sunset, when the smaller army turned and retreated, the victors pursuing it till all were lost in the rosy sunset haze. The ground beneath the combat was thickly strewn with wounded and dead warriors.

"The battle drew a thousand people. It occurred about thirty feet up in the air. The spectators were amazed and horror-stricken to see these gentle blue butterflies grappling and struggling furiously and silently in a blue blizzard above their heads."—*Newspaper*.

ENTOMOLOGICAL SOCIETY OF AMERICA.—The membership is already over two hundred and fifty, and these come from thirty-six States, from four Provinces of Canada, from the District of Columbia, from Cuba, and from Hawaii. The next meeting will be held about August 19th at Boston during the session of the International Congress of Zoology. The following meeting will be in Chicago during Convocation week in December.—J. CHESTER BRADLEY, *Secretary-Treasurer*.

CORRESPONDENTS will kindly allow me to state that I am now completing a monograph of American Stoneflies (Perlidae), and have in prospect further work upon the world-fauna in this family, and that I am in need of more material from all quarters for study. Perlidæ are so fragile and so unattractive to collectors that museum collections of them are exceedingly scanty. I should be greatly aided if my kind correspondents would send me such material as they have or can get easily in this group. Specimens in any stages, preserved in any way (alcoholic preservation is best for them)—even a very few of them—would be most acceptable to me. I will determine, or give named exchanges if desired, and I will gladly send my publications on the group to all who will aid me with material for study.—JAMES G. NEEDHAM, Cornell Univ., Ithaca, N. Y.

AN ENEMY OF THE ROCKY MOUNTAIN WHITE PINE.—Some time ago a student of mine, Miss Hazel Schmoll, kindly procured for me some cones of the white pine, *Pinus flexilis*, from Ward, Colorado, 9000 feet. On opening one of these to demonstrate its structure to the class, it was found that practically every seed was hollow, and contained a living Scolytid beetle. The destruction of the seeds—so well protected by the structure of the cone from the attacks of squirrels, etc.—must be very great, and may account for the fact that *Pinus flexilis* is not so abundant as several of the other conifers. Dr. A. D. Hopkins, to whom I naturally referred the beetles, says that they belong to an undescribed species of *Conophthorus*.—T. D. A. COCKERELL.

The following prescription is considered an unfailing specific for a disease among entomologists known as Hypertrophied Ego. It is not known to be contagious or epidemic, but it is certainly endemic. The remedy is as follows:

℞

	Corn meal . .	20 pounds.
	Sodium chloride .	1 ounce.
	Aquae fluviat . .	8 quarts.
M.	Burlap . . .	3 yards

S. Heat the water to the temperature of the blood; stir in the corn meal and salt; pour the mixture on the burlap and envelope the entire head with the poultice. Allow it to remain on over night. By morning the Ego will be reduced to normal proportions. Repeat if necessary.

A NEW local Entomological Society has been started at Palo Alto. Miss Julia Wright and Mr. Fordyce Grinnell, Jr., are leading spirits in this movement. We wish the new club a hearty success and long life.

DR. S. W. WILLISTON has in press the new edition of his "Manual of North American Diptera," which will be illustrated with about a thousand figures of flies and will greatly simplify the study of the order for beginners.

A DETERMINED fight is being made by the students and other friends of the College of Agriculture of the University of California to secure from the Legislature an appropriation for a large building to house the college. If this is accomplished the Entomological Department will leave its present temporary quarters and find accommodations in the new building.

Doings of Societies.

California, despite the seeming setback of April last, still continues to do her part in furthering the Science of Entomology, and, indeed, the Golden State offers splendid opportunities for active study, and there are many here who are doing good work.

Broadly speaking, the desire to form a club for any study indicates an earnest desire on the part of those interested for sincere co-operation and progress. The readers of the ENTOMOLOGICAL NEWS will doubtless be very glad to know that it is with this spirit that an interesting Entomological Club has been organized in Palo Alto, California, known as "The Santa Clara Valley Entomological Club," which covers the territory of the Santa Clara Valley.

The initial meeting was held December 5, 1906, at the home of Miss J. D. E. Wright. Fifteen entomologists assembled to discuss the formation of the society, and a committee on organization was appointed.

At the next meeting, held January 19, 1907, Mr. C. F. Palmer in the chair, the constitution and by-laws were adopted and the following officers elected for the ensuing year: President, Mr. R. W. Doane, Stanford University; Vice-President, Mr. Earl Morris, County Entomologist, San José; Secretary-Treasurer, Miss Julia D. E. Wright, Palo Alto.

Mr. Earl Morris gave an interesting talk on the duties of the

County Entomologist, which prove to be numerous and varied.

The President then outlined a plan of work to study the salt marsh fauna, which is interesting and peculiar in this district.

On February 8, 1907, a most successful meeting took place, at which twenty-five persons were present; Mr. R. W. Doane, presiding.

Miss Isabel McCracken, of Stanford University, told of her work on a sport of *Lina lapponica*, with notes of its heredity value, illustrated with formulæ of the breeding experiments. A box of specimens and also colored plates of the beetles were exhibited. Discussion followed, by Professor Kellogg, Mr. Doane, Mr. Fullaway, Mr. Derby, Mr. Grinnell.

Mr. F. X. Williams, who has recently returned with the expedition of the California Academy of Sciences, to the Galapagos Islands, then gave some of his experiences of the trip and collecting. The expedition as a whole seems to have been quite successful, but the insects were not very abundant, and as regards beetles, very few species were found, while only four species of butterflies were taken, all of which are distributed generally in the southern parts of this country. The meeting then adjourned.

The Santa Clara Valley Entomological Club holds its regular meeting once a month, and as soon as the weather permits, field days will be in order and the club will begin its collecting in earnest.

The following is a list of the charter members: Professor Vernon L. Kellogg, Mr. R. W. Doane, Mr. J. Chester Bradley, Secretary Entomological Society of America; Mr. C. F. Palmer, Mr. Earl Morris, Santa Clara County Entomologist; Mr. E. G. Dudley, Mr. H. V. Greenwood, Mr. W. M. Davidson, Mr. F. Grinnell, Mr. C. R. Coolidge, Mr. E. W. Rust, Mr. F. X. Williams, Mr. W. L. Scofield, Mr. E. J. Newcomer, Mr. D. I. Fullaway, Mr. A. W. Derby, Mr. J. G. Grundel, Mr. C. von Geldern, Miss Isabel McCracken, Miss Rose Patterson, Miss Alice M. Patterson, Miss Helen A. Lewis, Miss Elizabeth Scofield, Miss Julia D. E. Wright, Miss Edith Patterson.

JULIA D. E. WRIGHT, *Secretary.*